CASIO
IT-9000 Series
Hardware Manual

(Version 1.00)

CASIO Computer Co., Ltd.

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Change History

Manual Version no.	Date edited	Page	Content
1.00	March 2012	All	Original version

1. Overview of the Products

1.1 Features at a Glance

The IT-9000 series handheld terminal is designed using the new concept of the Human-centered Design Process and is capable of performing various powerful functions including;

Outstanding Development Environment

- Microsoft® Windows Mobile® 6.5 English Version as the integrated OS
- Windows® Embedded CE 6.0 R3 English Version as the integrated OS
- Visual Studio 2005
- Visual Studio 2008

CPU, Memory

- High-performance CPU
  Marvell® PXA320 Application Processor (runs at 624 MHz, maximum)
- Large-capacity memory
  RAM : 256 MB
  F-ROM : 256 MB

Capability of Scanning Industrial Standard Bar Code Symbologies

- 1D symbologies (with C-MOS Imager models. See Chapter 1.2.)
  UPC-A, UPC-E, EAN8, EAN13, Codabar (NW-7), Code39, Interleaved 2of5 (ITF), MSI, Code11, Code32, Code93, Code128 (GS1-128), IATA, GS1 DataBar Omnidirectional, GS1 DataBar Limited, GS1 DataBar Expanded, GS1 DataBar Trancated
- 2D Stacked symbologies (with C-MOS Imager models. See Chapter 1.2.)
  PDF417, Micro PDF, Code49, Composite, Codablock F, TLC39, GS1 DataBar Expanded Stacked, GS1 DataBar Stacked
- 2D Matrix symbologies (with C-MOS Imager models. See Chapter 1.2.)
  Aztec, DataMatrix, Maxicode, QR Code, Micro QR, Chinese Sensible Code (HanXin Code)

Capturing Images

- Integrated digital camera (2.0 mega pixels, Autofocus)

Compatibility of Various Communication Options

- Integrated WWAN module compatible with GSM, GPRS, and EGPRS (EDGE)
- Integrated WLAN module compatible with IEEE802.11b/g standard
- Integrated GPS module
- Bluetooth® Version 2.0+EDR
- USB version 1.1 (Host/Client) for serial interface

Expandability

- microSD (SDHC) card slot

Improved Environment Durability

- Impact resistance : 1.5 m in height*
- Dust/Water-splash proof : IP54 level (compliant with IEC60529 International Standard)

* ; The drop durability height is a measured value resulting from actual testing. It does not necessarily guarantee the product from damage.

1.2 Available Models

Table 1.1 List of available models

Model No.	OS	Printer	C-MOS Imager	W-WAN	W-LAN	Magnetic Card Reader	SAM Slot	Camera	2ndSD Slot
IT-9000-E	CE	80mm	-	-	11bg	-	3	-	-
IT-9000-GE	CE	80mm	-	Yes	11bg	-	2	-	-
IT-9000-GMC30E	CE	82.55mm	Laser Aimer	Yes	11bg	Yes	2	Yes-	-
IT-9000-20E	CE	80mm	Laser Aimer	-	11bg	-	3	-	-
IT-9000-G20E	CE	80mm	Laser Aimer	Yes	11bg	-	2	-	-
IT-9000-GM30E	CE	82.55mm	LED Aimer	Yes-	11bg	Yes×	2	-	-
IT-9000-05E	Mobile	80mm	-	-	11bg	-	3	-	-
IT-9000-05E-CN	Mobile	80mm	-	-	11bg	-	1	-	-
IT-9000-G05E	Mobile	80mm	-	Yes	11bg	-	2	-	-
IT-9000-GMC25E	Mobile	80mm	LED Aimer	Yes	11bg	Yes	2	Yes	-
IT-9000-25E	Mobile	80mm	Laser Aimer	-	11bg	-	3	-	-
IT-9000-G25E	Mobile	80mm	Laser Aimer	Yes	11bg	-	2	-	-
IT-9000-GC25E	Mobile	80mm	Laser Aimer	Yes	11bg	-	2	Yes	-
IT-9000-GM35E	Mobile	82.55mm	LED Aimer	Yes	11bg	Yes	2	-	-
IT-9000-MC25E*	Mobile	80mm	Laser Aimer	-	-	Yes	3	Yes	Yes-
IT-9000-C25E*	Mobile	80mm	Laser Aimer	-	-	-	3	Yes	Yes

Notes

- "-CN" in the "Model no." box denotes that the model is dedicated for China only.
- Model with "*" at its model number is for USA and Canada only.
- NFC is the contactless smart card technology developed by Sony Corporation.

Table 1.2 List of options

Option	Product	Model no.	Remark
Cradle	USB Cradle	HA-L60IO	
		HA-L60IO-CN	for China
	Ethernet Cradle	HA-L62IO	
		HA-L62IO-CN	for China
Battery	Battery Pack	HA-G20BAT	
		HA-G20BAT-CN	for China
Battery charger	Dual Battery Charger	HA-G32DCHG	
		HA-G32DCHG-CN	for China
	Cradle-type Battery Charger	HA-L30CHG	
		HA-L30CHG-CN	for China
	Car Mounted-type Battery Charger	HA-L35CHG	
		HA-L35CHG-CN	for China
AC adaptor (for HA-L60IO, HA-L62IO, HA-G32DCHG)		AD-S42120B-N	without power cable accompanied for global without Europe
		AD-S42120C-N5	without power cable accompanied for Europe
		AD-S42120BE-CN	for China
Power Cable (for AD-S42120)		AC-CORD-EU	for Europe
		AC-CORD-US	for USA/Canada
		AC-CORD-TW	for Taiwan
		AC-CORD-KR	for Korea
		AC-CORD-AU	for Australia/New Zealand
Cable	USB cable	DT-380USB	for cradle – PC
		DT-380USB-CN	
		HA-L80USBH	For Host
		HA-L80USBH-CN	
		HA-L81USBC	For Client
		HA-L81USBC-CN	
Others	Screen Protect Sheet	HA-C90PS5B	

Note:
"-CN" in the "Model no." box denotes that the model is dedicated for China only.

1.3 Options and Interfaces

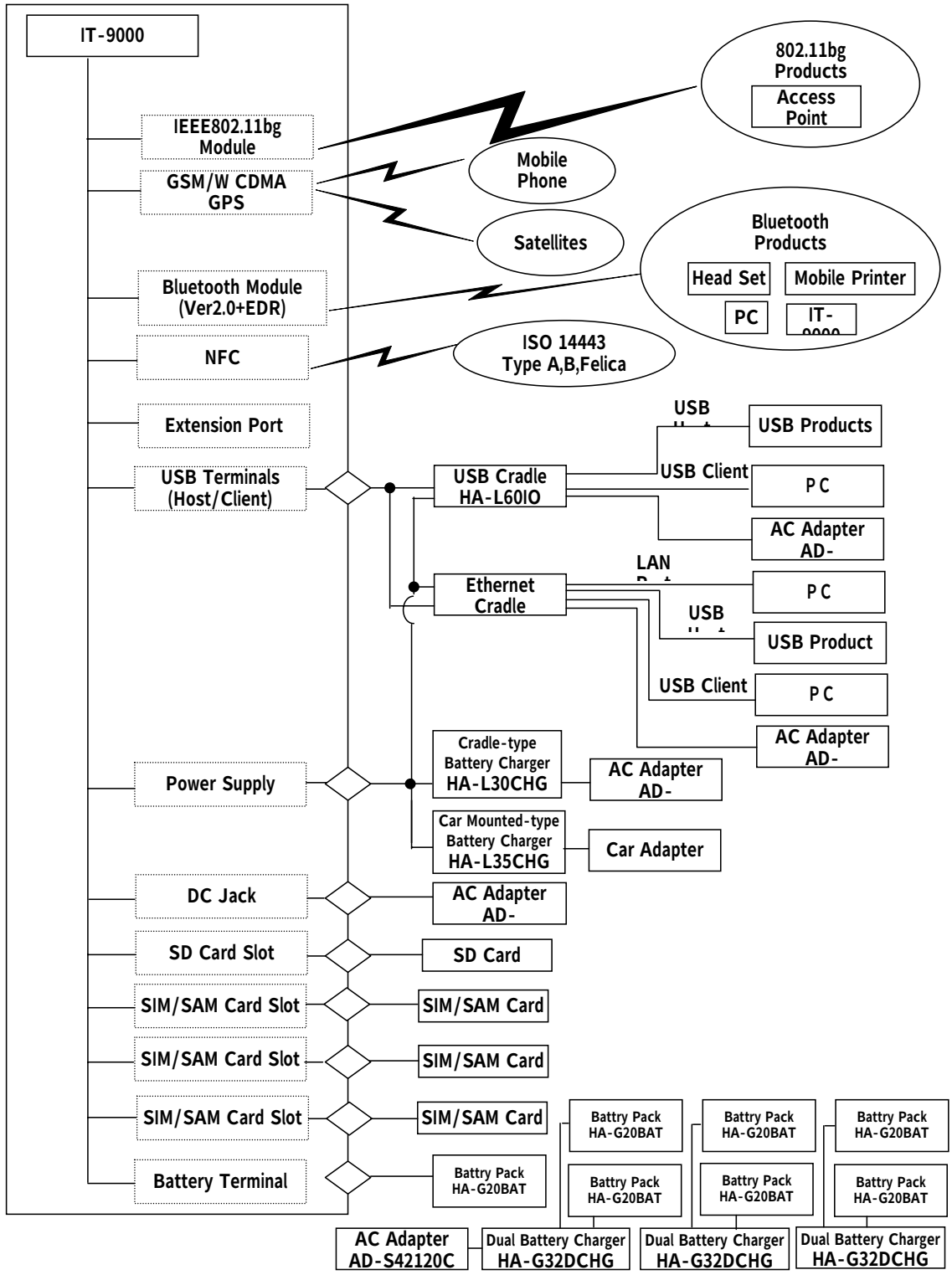


Figure 1.1

1.4 External Views

1.4.1 IT-9000

The following external views show all models of IT-9000 series PDA. Refer to Table 1.3 for each referenced part on the terminal.

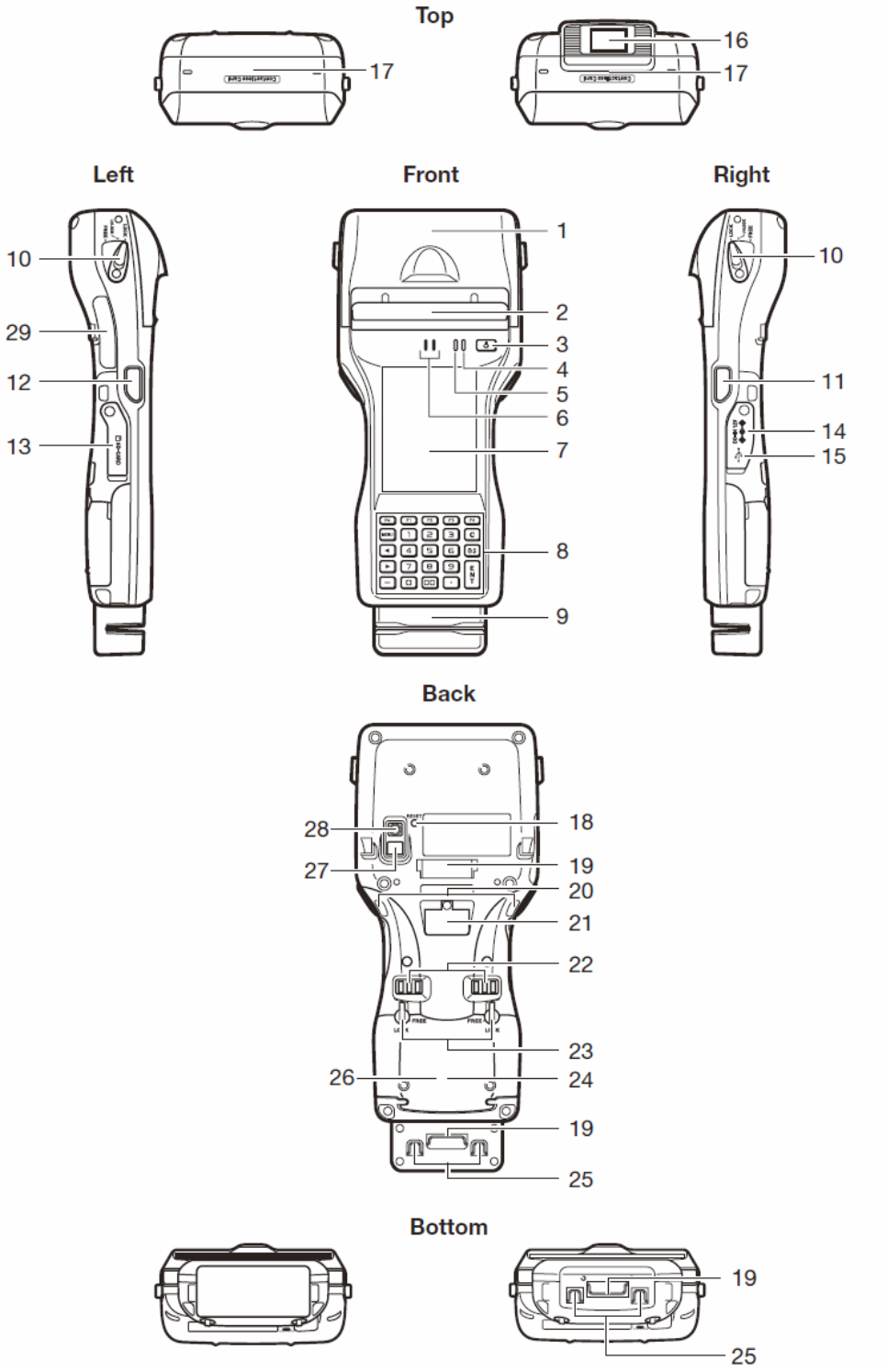


Figure 1.2

Table 1.3

No.	Name	Description
1	Printer	Printed roll paper is torn off here.
2	Splash Protect Cover	The splash protect cover. Open the cover when printing.
3	Power Key	Turns on and off the power.
4	Indicator 2	Flashes in blue when operating via Bluetooth or in orange when operating via WLAN, WWAN or GPS. Lights in green when reading a bar code successfully or in red when alarming (programmable).
5	Indicator 1	Orange : Charging battery pack. Green : Charging battery pack is complete. Red : Battery pack is abnormal or the surrounding temperature is out of the charging temperature range.
6	Speaker	Buzzer and voice messages are output.
7	Touch Screen	Displays text and operating instruction. Also used to operate the terminal and enter data using stylus provided.
8	Stroke key	There are a total of 24 keys including function keys , numeric keys and cursor Key. Each numeral or symbol on the key tops is backlit.
9	Magnetic Card Reader	Magnetic cards are read by passing through this magnetic card reader.
10	Printer Cover Lock Switch	Lock the Printer Cover.
11	R-side key	This key can be assigned to any function available. In the imager model, use it to scan bar codes.
12	L-side key	This key can be assigned to any function available. In the imager model, use it to scan bar codes.
13	SD card slot	Slot for inserting SD memory card.
14	DC Jack	The dedicated AC Adaptor is connected to this jack when charging the lithium-ion battery pack.
15	USB Port	For connecting to a USB products.
16	Barcode reader	Reads 1D and 2D symbologies.
17	NFC Reader	
18	Reset Switch	Used to reset the terminal.
19	Hand Strap Hook	Hook the hand strap here.
20	Cradle Mount Holes	Used to mount the terminal in cradle.
21	Extension Port	Provided for connecting an external device.
22	Power Supply/Data Communication terminals	Used for USB communication or to supply power to the terminal and to charge the battery pack via either Cradle or Cradle-type Battery Charger.
23	Battery Pack Cover Lock Switch	Used to lock the battery cover and to release it.
24	Battery Pack Cover	Used to cover the battery compartment that holds the battery pack inside.
25	Neck Strap Hooks	Hook the neck strap here.
26	SIM/SAM Card slot	Slot for inserting SIM/SAM card.
27	LED Light (Flash)	Used to light up an object when capturing it with the digital camera.
28	Digital Camera	Used to capture photographs, images.

1.4.2 HA-L60IO, HA-L62IO

The following external views show the USB Cradles (HA-L60IO, HA-L60IO-CN) and Ethernet Cradle (HA-L62IO, HA-L62IO-CN). Refer to Table 1.4 for each referenced part on the cradles.

Views

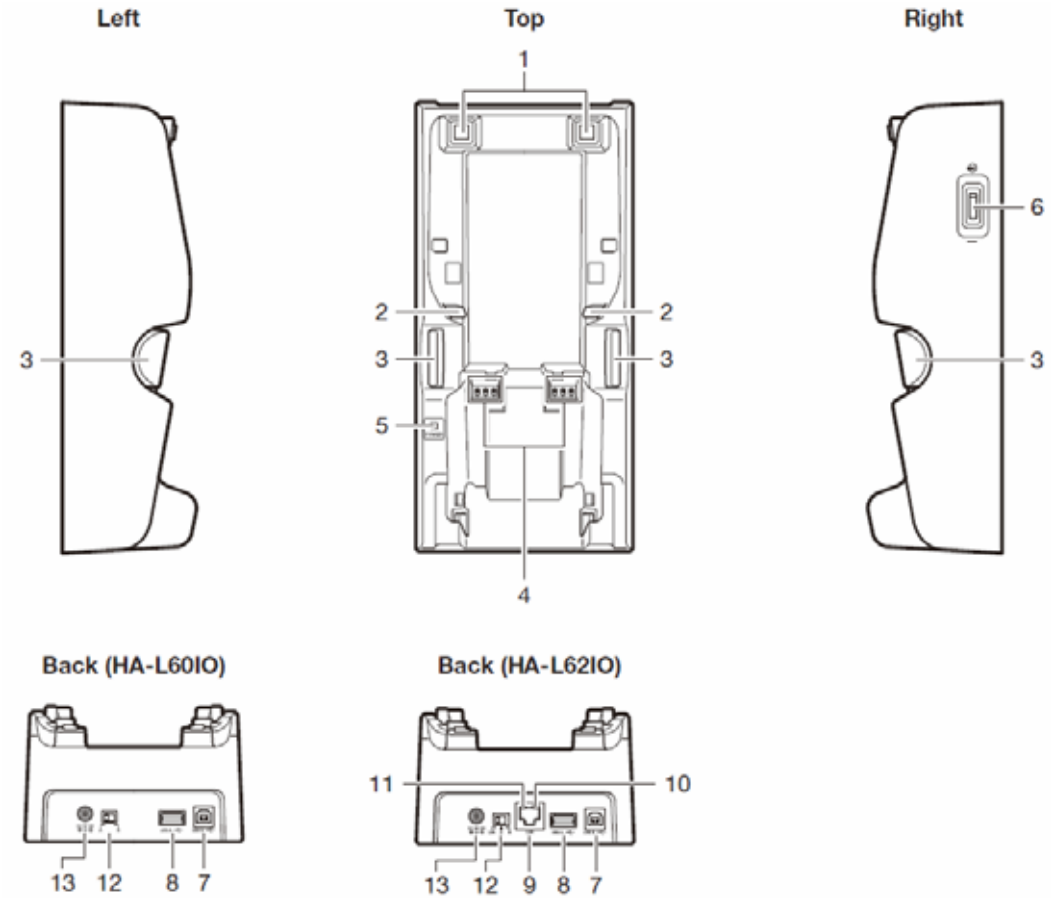


Figure 1.3

Table 1.4

No.	Name	Description
1	Terminal Detect Switch	This switch detects when the terminal is mounted correctly on the cradle.
2	Mount Hooks	Used to hook the terminal in the cradle.
3	Removal Button	Used to remove the terminal in the cradle.
4	Power Supply/Data Communication terminal	These contacts are used for communication and supplying power to the terminal.
5	Power LED	This LED indicates the power status and the mounting status of the terminal in the cradle. Off : The terminal is not mounted. Or, the AC adaptor is not connected. On in Green : Power is turned on, and the terminal is correctly set in the cradle.
6	Power Switch	Turns on and off the power.
7	USB Client Port	This port is used to transmit data (download or upload) by connecting the Cradle to a PC using USB cable (DT-380USB). The dedicated driver must be installed in the PC before connecting the Cradle to the PC.
8	USB Host Port	This port is used to connect a USB peripheral device.
9	LAN Port (for HA-L62IO)	This port is used for connecting the cradle to PC or hub via LAN cable so that data can be transmitted (uploaded or downloaded).
10	LAN Connection Status LED (for HA-L62IO)	This LED shows the LAN connection status. Off : LAN cable not connected correctly. On in Green : LAN cable connected correctly.
11	LAN Communication Status LED (for HA-L62IO)	This LED shows the LAN operation status. Off : No communication. On in Green : Communication in progress.
12	Selector Switch	This switch is used to switch between the USB host port and USB client port.
13	AC Adaptor Jack	Connect the dedicated AC adaptor, AD-S42120, here.

1.4.3 HA-L30CHG, HA-L35CHG

The following external views show the Cradle-type Battery Chargers (HA-L30CHG, HA-L30CHG-CN) and Car Mounted Cradle-type Battery Chargers (HA-L35CHG, HA-L35CHG-CN). Refer to Table 1.5 for each referenced part on the charger.

Views

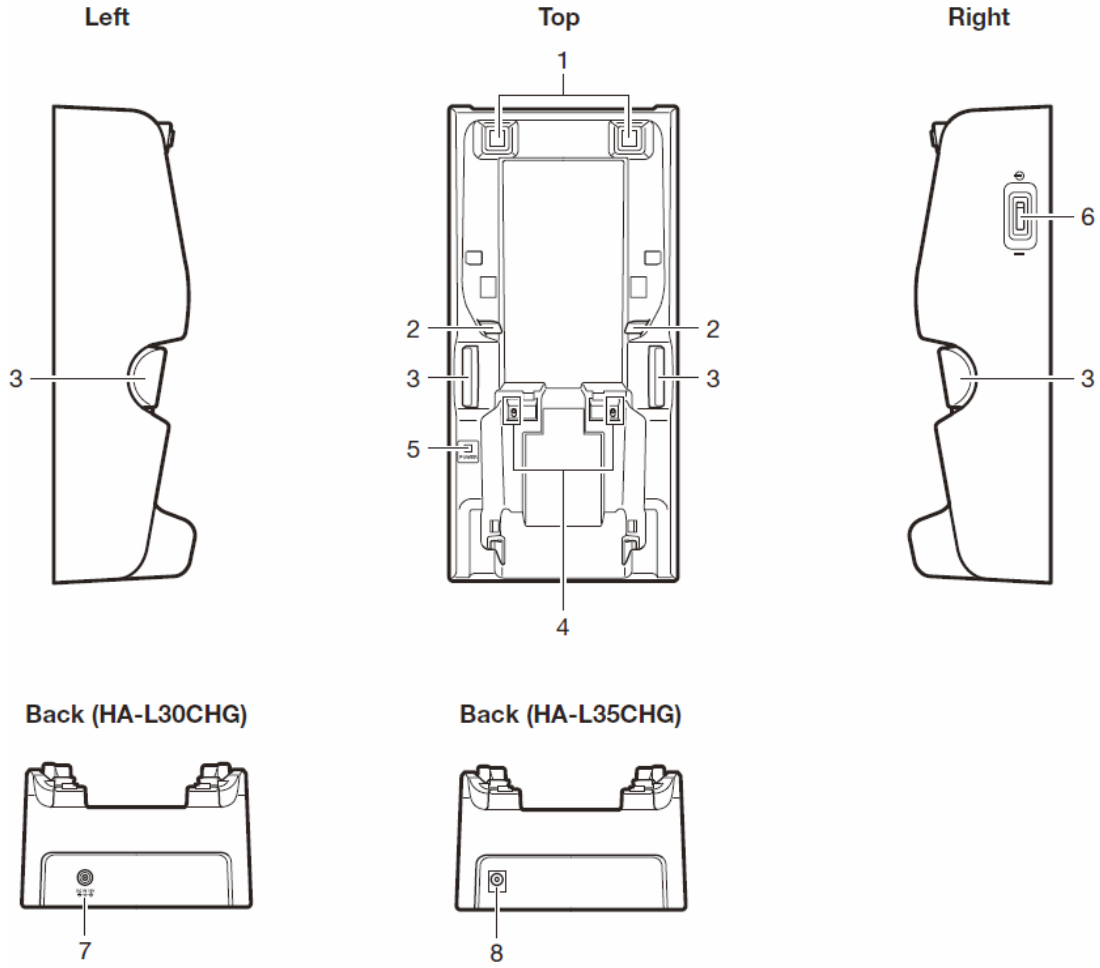


Figure 1.4

Table 1.5

No.	Name	Description
1	Terminal Detect Switch	This switch detects when the terminal is mounted correctly on the Battery Chager .
2	Mount Hooks	Used to hook the terminal in the Battery Charger.
3	Removal Button	Used to remove the terminal in the Battery Charger.
4	Power Terminals	Power is supplied to the terminal via these contacts.
5	Power LED	This LED indicates the power status and the mounting status of the terminal. Off : The terminal is not mounted. On in green : Power is turned on and the terminal is mounted correctly.
6	Power Switch	Turns on and off the power.
7	AC Adaptor Jack	Connect the dedicated AC adaptor, AD-S42120, here.
8	Car plug code Jack	Connect the dedicated Car plug code , here.

1.4.4 HA-G32DCHG

The following external views show the Dual Battery Chargers (HA-G32DCHG, HA-G32DCHG-CN). Refer to Table 1.6 for each referenced part on the charger.

Views

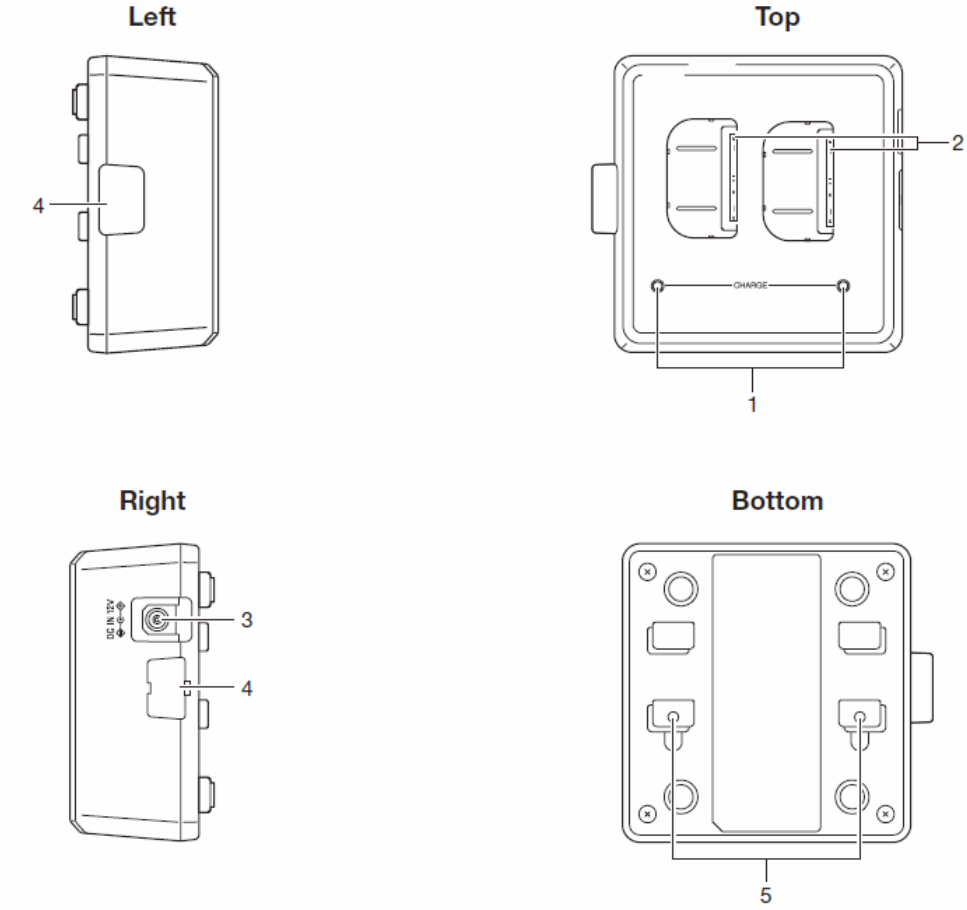


Figure 1.5

Table 1.6

No.	Name	Description
1	Charge Indicator LED	This LED indicates the charge status of battery pack(s). Off : Battery pack is not mounted. Red : Charging. Flashing Red : Problem on the battery pack. Green : Charging complete. Flashing Green : Standby.
2	Power Supply Terminal	Power is supplied to the terminal via these contacts.
3	AC Adaptor Jack	This is used to supply power by connecting the dedicated AC adaptor, AD-S42120, here.
4	Dual Battery Charger Connection Port	Used to connect multiple Dual Battery Chargers each other.
5	Connection Bracket Attachment Holes	The connection bracket attaches here when you connect multiple Dual Battery Chargers.

1.4.5 HA-G20BAT

The following external view shows the Battery Packs (HA-G20BAT, HA-G20BAT-CN).

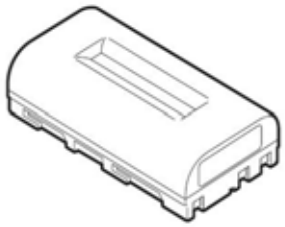


Figure 1.7

1.4.6 HA-C90PS5B

The following external view the Screen Protect Sheet (HA-C90PS5B).

Figure 1.9

1.4.7 AD-S42120

The following external view shows the AC Adaptors
(AD-S42120C-N5,AD-S42120B-N,AD-S42120BE-CN).

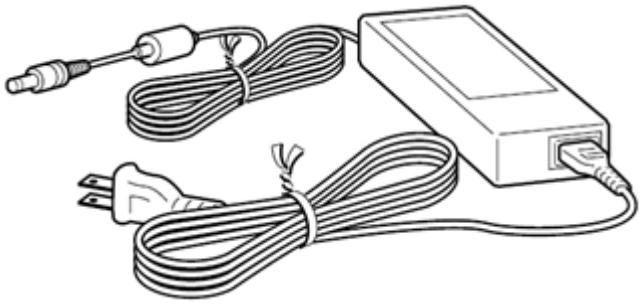


Figure 1.11

Note:
Power cable does not accompany to the AC Adaptor.

1.4.8 DT-380USB

The following external view shows the USB cable between cradle and PC.

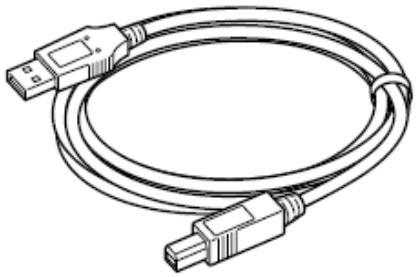


Figure 1.5

1.4.9 HA-L80USBH

The following external view shows the USB cable (Host).

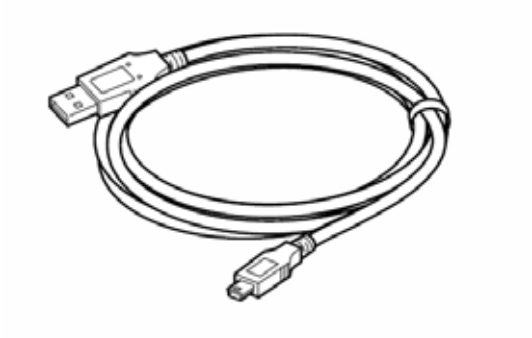


Figure 1.6

1.4.10 HA-L81USBC

The following external view shows the USB cable (Client).

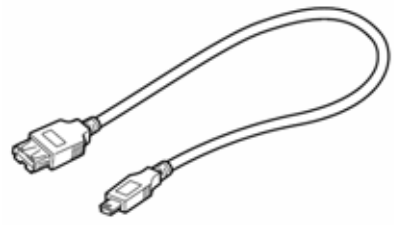


Figure 1.7

2. Hardware Specifications

2.1 IT-9000

Tables 2.1 and 2.2 explain about the hardware specifications of all models of IT-9000 series including the models with "-CN" denotation.

Table 2.1

Item		Specification	Remark
CPU, Memory			
	CPU	Marvell® Xscale Processor PXA320 runs at 624 MHz	
	RAM	256MB	
	FROM	256 MB (user area; CE:approx. 176MB Mobile:approx. 130MB	
OS		Microsoft® Windows EmbeddedCE® 6.0R3 English Version Microsoft® Windows Mobile® 6.5 English Version Classic (without W-WAN model) Professional (with W-WAN model)	

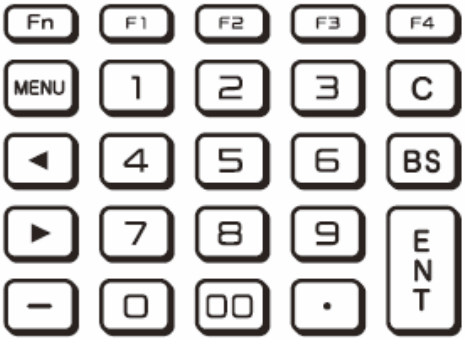
Continue.

C-MOS Imager			
	Method	C-MOS Imager, 752 x 480 (Wide VGA), monochrome	
	Aimer method	Laser 650+10nm or -5nm <1 mW	
	Laser emit angle	Redirected downward at 0 degree	
	Resolution	1D : 0.15mm Stacked 2D : 0.169mm Matrix 2D : 0.25mm	
	PCS	0.45 (minimum)	
	Focal distance	4.5 inches (11.43 cm)	
	Daylight for scanning	50,000 Lux or less	
	Readable 1D symbologies	UPC-A, UPC-E, EAN8, EAN13, Codabar (NW-7), Interleaved 2of5 (ITF), MSI, Code11, Code32, Code39, Code93, Code128 (GS1-128), IATA, GS1 DataBar Omnidirectional, GS1 DataBar Truncated, GS1 DataBar Limited, GS1 DataBar Expanded	
	Readable Stacked 2D symbologies	PDF417, Micro PDF, Code49, Composite, Codablock F, TLC39, GS1 DataBar Expanded Stacked, GS1 DataBar Stacked	
	Readable Matrix 2D symbologies	Azteck, DataMatrix, Maxicode, QR Code, Micro QR	
Vibrator		Notification of scanning bar code	
Display			
	Display device	TFT	Blanview® by OrutusTtech
	No. of dots	480 (horizontal) x 640 (vertical) VGA	See “Dead Pixels”.
	Dot pitch	0.117 (horizontal) x 0.117 (vertical) mm	
	Gradation	65,536 colors	
	Display font	Scalable font	
	Backlight	LED backlight	
	Viewing angle	35 degree (Left, Right), 10 degree (Up), 50 degree (Down)	Contrast 10 over
Touch Panel		Resistive expression analog touch panel	plastic
	Hardness	Pencil hardness 2H over	
Indicator			
	LED	Indicator 1; status of charging battery pack, Indicator 2; status of communication	

Dead Pixels

The LCD panel employed in this product uses high precision and substantial number of components which commonly cause a small number of the pixels not to light or to remain lit all the time. This is due to the characteristics of LCD panel yield in accuracy over 99.99% and permissible.

Continue.

Input				
	Keyboard			
	Control keys	Power key, Reset switch		
	Side keys	L-Side,/R-Side key		
WLAN				
	Standard	IEEE 802.11b/g		
	Module no.	WM-G-MR-09-REF2		By USI
	Radio type	Spread Spectrum		
	Emission Designation	IEEE801.11b : D1D, G1D IEEE802.11g : G1D		ITU
	Spectrum Spread modulation	IEEE802.11 b : DSSS IEEE802.11 g : OFDM		
	Modulation type	BPSK, QPSK, CCK, 16QAM, 64QAM		
	Frequency range	IEEE802.11b : 2,400 to 2,483.5 MHz IEEE802.11g : 2,400 to 2,483.5 MHz		
	Baud rate	IEEE802.11b : 11 Mbps (maximum) IEEE802.11g : 54 Mbps (maximum)		
	Communication range	IEEE802.11b/g : 50 m (indoor) to 150 m (outdoor)		Vary depending on the environment condition
	Number of channels	11b : 13 11g : 13		
	Channel spacing	5MHz		
	Channel band width	22MHz		
	Output power	IEEE802.11b : 13.5dBm (minimum) 17.5dBm (maximum) IEEE802.11g : 12.5dBm (minimum) 16.5dBm (maximum)		
	Other feature	Roaming among Access-Points		
	Security	Security	: WEP (64/128bit), WPA, WPA2	
		WPA encrypted method	: TKIP, AES	
		Authorize method	: PSK, EAP-TLS, PEAP-MSCHAP-V2	

Continue.

Printer			
	Method	Dropin-type　Thermal line dot	
	Paper width	80 mm or 58 mm	The width of paper must be preset with software prior to use of the printer. In order to use 58mm paper, “58mm Width Adjuster” must be installed first.
	Printing width	72 mm (for an 80 mm/82.55mm paper) 48 mm (for a 58 mm paper)	
	Paper thickness	55 μ～110 μ	
	Speed	28 lines per second (Max.)	See note 1.
	Paper	Roll paper, label paper	Use only CASIO recommended papers.
	Font size	“x1”, “x1.5”, “x2”, “x3”, and “x4” sizes are supported.	
	Font types	ANK/Symbologies (UPC-E, NW-7,　Code39, ITF, Code128, OCR-B,　user-defined characters x 128)	
	Print function	In white, black and reverse modes. Mixture of different font sizes.	
	Sensor	Print position aline Backside barcode read	-
	Dot pitch	0.125mm(8dot/mm)	
	Dot size	0.22mm (Length) ×0.125mm(Width)	-
	1dot line	0.125mm	-
SAM			
	Standard	ISO7816 IC Card standard	
	General specification	3V, 1.8V SIM card supported	
MCR			
	Application card	F2F FormatISO7811-2、ISO7811-6）	
	The number of the simultaneous uptake trucks	3Tracks（ISO7811-2、ISO7811-6）	
	Magnetic data reading side	One side	
	Card run direction	Both direction	
	Card slide speed	100～1500mm/sec	

Continue.

Bluetooth Class 2			
	Standard	Bluetooth® specification Ver.2.0+EDR	
	Module no.	LBMA46LCS3-332	- By Murata Manufacturing Co., Ltd.
	Radio type	Spread Spectrum	-
	Modulation	Frequency Hopping (“FHSS”)	
	Modulation type	GFSK (1Mbps), Π/4-dqpsk (2Mbps), 8-DPSK (3Mbps)	
	Emission Designation	F1D, G1D	ITU
	Frequency range	2,400 to 2,483.5 MHz	
	Communication range	Approx. 3 m	- Vary depending on the environment conditions
	Number of channels	79	-
	Channel spacing	1 MHz	-
	Channel band width	1 MHz	-
	Output power	Max. 4 dBm (PowerClass 2)	-
GSM			
	Standard	3GPP release 99	
	Module no.	MC8795V	- By Sierra Wireless
	Features	Voice, Packet data	-
	Data transfer / Packet	GPRS: Multi Slot Class 12 Mobile Station Class B Coding Scheme CS1-4 EGPRS(EDGE): Multi Slot Class 12 Mobile Station Class B Coding Scheme MCS1-9	-
	Modulation type	GSMK/8-PSK (EGPRS(EDGE)	
	Emission Designation	GPRS : 252KGXW EGPRS(EDGE) : 248KG7W	- ITU

Continue.

	Frequency range	GSM850 Uplink : 824 to 849 MHz Downlink : 869 to 894 MHz E-GSM900 Uplink : 880 to 915 MHz Downlink : 925 to 960 MHz GSM1800 (DCS1800) Uplink : 1,710 to 1,785 MHz Downlink : 1,805 to 1,880 MHz GSM1900 (PCS1900) Uplink : 1,850 to 1,910 MHz Downlink : 1,930 to 1,990 MHz	
	No. of Channels	GSM850 : 124 GSM900 : 174 GSM1800 (DCS1800) : 374 GSM1900 (DCS1900) : 299	
	Channel spacing	200 KHz	
	Channel band width	200 KHz	
	Output power	GSM850 : 32 dBm GSM900 : 32 dBm GSM1800 (DCS1800) : 29 dBm GSM1900 (DCS1900) : 29 dBm	
W-CDMA			
	Standard	UMTS/W-CDMA : 3GPP release 99 HSDPA : 3GPP release 5	
	Module no.	MC8795V	- Sierra Wireless
	Communication features	Voice, Packet data	
	Data transfer / Packet	64Kbps, 128Kbps, 384Kbps Category 12 (1.8Mbps) Category 6 (3.6Mbps) Category 8 (7.2Mbps)	HSDPA HSDPA HSDPA
	Modulation type	W-CDMA : BPSK, HPSK, QPSK HSDPA : QPSK, 16QAM (Category 6, Category 8)	Data Modulation Up/Down : BPSK/QPSK Diffusion Modulation Up/Down : HPSK/QPSK
	Emission Designation	4M21F9W	ITU

Continue.

	Frequency range	Band I UMTS2100 Uplink : 1920 1980MHz Downlink : 2110 2170MHz Band II UMTS1900 Uplink : 1850 1910MHz Downlink : 1930 1990MHz Band V UMTS850 Uplink : 824 849MHz Downlink : 869 894MHz Band VI UMTS800 Uplink : 830 840MHz Downlink : 875 885MHz Band VIII UMTS900 Uplink : 880 915MHz Downlink : 925 960MHz	
	No. of Channels	Band I : 299 Band II : 299 Band V : 124 Band VI : 49 Band VIII : 174	
	Channel spacing	200 KHz	
	Channel band width	5MHz	
	Output power	Band I UMTS2000 : 23dBm Band II UMTS900 : 23dBm Band V UMTS850 : 23dBm Band VI : UMTS800 : 23dBm Band VIII : UMTS900 : 23dBm	
GPS			
	General specification	12 channels and receiver / L1 1575.42 MHz, C /A code	
	Positioning system	Standalone – GPS (S-GPS) Assisted – GPS (A-GPS)	
	Protocol	NMEA-0183	
	Sensitivity	Acquisition sensitivity: -145 dBm Tracking sensitivity : -158 dBm	
SIM			
	Standard	ISO7816 IC Card standard	
	General specification	3V, 1.8V SIM card supported	

Continue.

NFC				
	Carrier frequency		13.56MHz±7kHz	
	Antenna		Magnetic loop antenna	
	Field work		Magnetic field strength (at contact with case) output 1.5A/m over	Compliant with ISO10373-6
			Magnetic field strength (at 50mm distance from case) output 0.15A/m over	Compliant with ISO10373-7
	Bit rate		ISO14443 Type A : 106kbps ISO14443 Type B : 106kbps FeliCa : 212kbps, 424kbps ISO15693 : 1.65kbps	
	Modulation		ASK	
	Modulation rate		10%, 100% modulation	
	Read range		ISO14443 Type A/B, FeliCa : 0mm (Contact with case)	
			ISO15693 : 0mm (Contact with case) to 60mm (max)* *Reference value because different with tag antenna design	
	Read area		30mm x 60mm	Dependent on smart card
	Communication protocol		Standard:	
			ISO14443 Type A (MIFARE Standard /MIFARE Ultralight)	
			ISO14443 Type B (JICSAP)	It is recommended to use smart card that is compliant with the ISO standard.
			FeliCa® (JIS X6319) (FeliCa Standard)	
			ISO15693 (I.CODE SLI/I.CODE S LI-S/I.CODE SLI-L/my-d VID plain/my-d Light/Tag-it plus* /Tag-it pro/Tag-it standard) * There is some not support command.	It takes time for write Tag-it data. There is command which is needed retry operation in application.
SD slot			Compatible with SDHC/SDIO.	
micro SD			Compatible with SDHC.	
USB				
	Host	Baud rate	Full speed (12 Mbps)	
			Low speed (1.5 Mbps)	
		Power to external device	5V/500mA	
	Client	Baud rate	Full speed (12 Mbps)	
Power/Signal terminals				
	Pin layout		See Table 2.2.	

Continue to page 26.

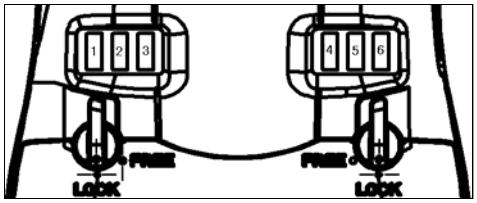


Table 2.2

Pin no.	Signal	Description	Direction
1	GND	GND	-
2	D -	USB D-	IN/OUT
3	D +	USB D+	IN/OUT
4	V BUS	Power from USB cradle	OUT IN/OUT
5	USB_ID	Switch-over between USB host and USB client	IN
6	V CRADLE	Power supply/Charge to the terminal	-

Continued from page 25.

Camera			
	Number of pixels	Approximately 2,000,000 pixels	- 1,600 x 1,200 pixels
	Device	1/4.0-type color CMOS	
	F value (Aperture)	2.8±5%	
	Focal distance	f = 3.45 mm (Autofocus)	
	Image capture range	10 cm to infinite	
LED light		21,000 mcd	
Speaker		Warning sound, etc.	
Microphone		Voice sound input	
Power			
	Operating power	Lithium-ion battery pack	- HA-D20BAT - HA-D21LBAT
	Memory backup	Lithium battery (rechargeable)	- Integrated
	Operating period	Approx 20hours Above time periods are based on the ratio of cyclic operation of "Standby: Calculation: Scanning" at 20:1:1, and under the conditions; - Auto Power Save mode (CPU) - Backlight Off	- At room temperature - New battery pack
		Approx 16hours Above time periods are based on the ratio of cyclic operation of "Standby: Calculation: Scanning: WLAN" at 20:1:1:1, and under the conditions; - Auto Power Save mode (CPU) - Backlight Off	
		W-WAN Waiting Approx (TBD) hours W-WAN continuous communication Approx (TBD) minutes	- At room temperature - New battery pack - W-WAN model

	Memory backup period (with memory backup battery only)	Approx. 10 minutes for RAM Approx. 72 hours for integrated clock		- Lithium battery (on-board) is fully charged. - At room temperature.
	Memory backup period (with battery pack and memory backup battery)	Approx. 72 hours for RAM		- The backup period starts when "Main battery low warning" appears.
	Battery pack charge period	Approx. 4 hours by HA-G20BAT		- Power on the terminal is turned off while the battery is being charged. - At room temperature.
	Charge method	See Table 2.3.		-
	Memory backup battery charge period	Approx. 4 days (for fully charged level)		- Battery pack is being installed in the terminal. - At room temperature.
	Backup battery specification	See Table 2.4.		
	Memory backup battery rated capacity	50 mAh		
	Method to charge memory backup battery	When power supply is made via cradle	Yes	
		When power supply is made by installed battery pack (when terminal's power on)	Yes	
		When power supply is made by installed battery pack (when terminal's power off)	Yes	

Charge Method

Table 2.3

Cradles, Charger	Condition to start charging	Action after charge is complete
HA-L60IO HA-L62IO HA-L30CHG HA-L35CHG	Set the terminal on one of the options listed on left side.	Charging the battery pack starts again when the output voltage is lower to certain level.

Backup by Backup Battery

Table 2.4

Backup item	Backup periods	Remarks
RAM and RTC	0 to 10 minutes	The backup for RAM and RTC (integrated clock) is about 10 minutes by integrated timer. After elapse of 10 minutes, the backup is for only the RTC.
RTC	10 minutes to 4 days	The over-discharge protection starts when remaining capacity of the memory backup battery is at 10 percent. Once the over-discharge protection takes place, the backup to the RTC stops.

Cyclic Life of Memory Backup Battery

The more the memory backup battery is used often, the more quickly deterioration on the cyclic life worsens. See the table below. Note that the life period in the above explanation is based on condition that memory backup for 10 minutes or RTC backup for 3 days is no longer possible.

Table 2.5

Content backed up and period	Used capacity of memory backup battery	No. of cyclic life of charge/discharge
Memory +RTC for 10minutes	1% or less	About 20,000 times
RTC for 1 day	About 5%	About 3,000 times
RTC for 2 days	About 9%	About 1,000 times
RTC for 4 days	About 18%	About 500 times
RTC for 6 days	About 27%	About 275 times
RTC for 8 days	About 36%	About 160 times
RTC for 10 days	About 45%	About 110 times
RTC for 12 days	About 54%	About 90 times
RTC for 14 days	About 63%	About 75 times
RTC for 16 days	About 72%	About 60 times
RTC for 18 days	About 81%	About 55 times
RTC for 20 days	About 90%	About 50 times

Therefore, excluding the cases below, always install battery pack fully charged in the terminal so that the contents can be backed up by the battery pack (see note) instead by the memory backup battery.

- Long-term storage exceeding over 1.5 months period.
- Backup for the RTC within one day period, relatively the rate of use with the terminal is less.

Note:
The contents in the table can be backed up for approximately 30 days by battery pack (HA-G20BAT) fully charged.

Dimensions and Weight

1.Non-Scan Engine Models without MCR

- Dimensions

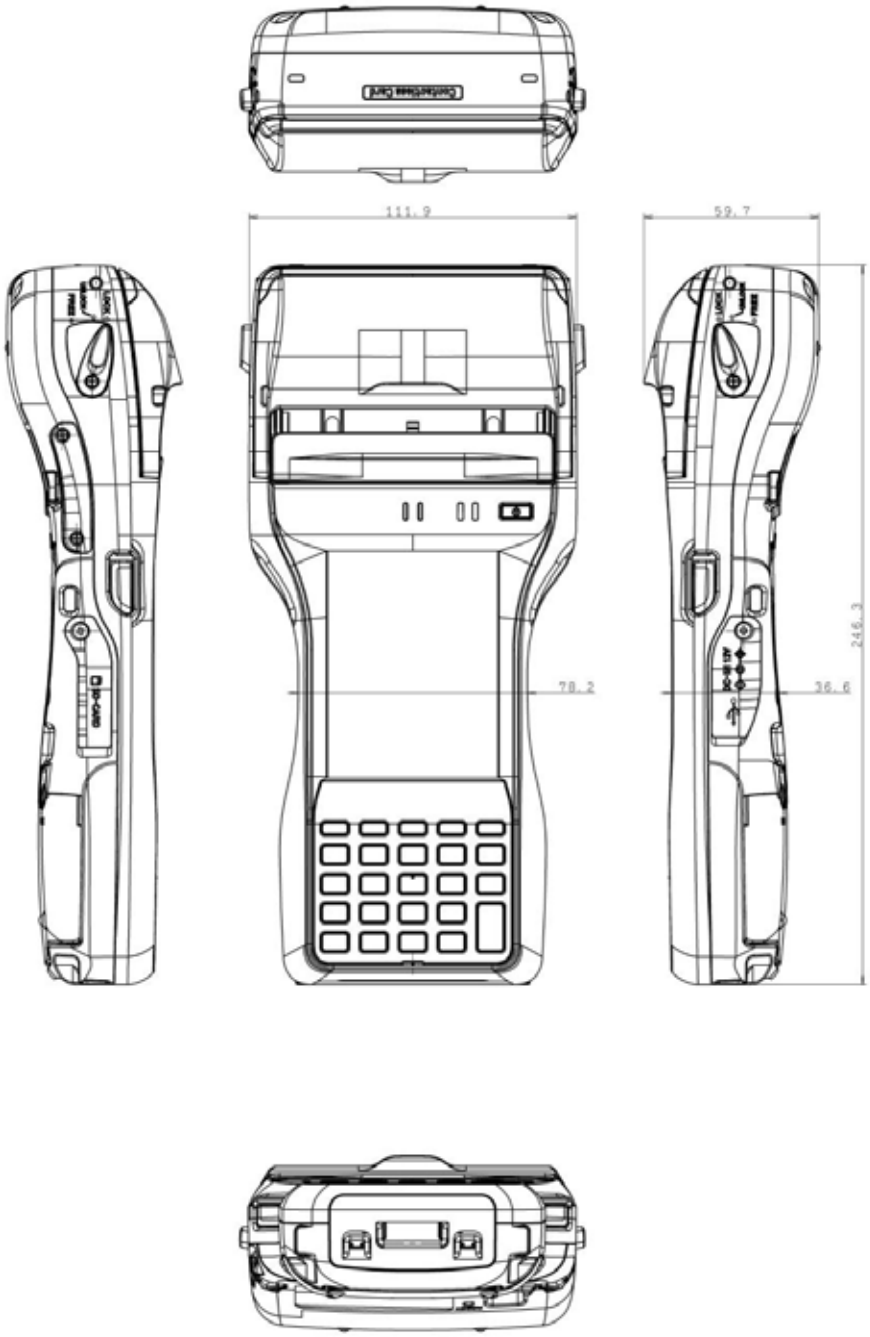


Figure 2.1 Dimensions in millimeters

- Weight

Table 2.6

Model no.	Weight	Remarks
IT-9000-E/05E/05E-CN	Approx. 590g	with battery pack installed/ without Role Paper.
IT-9000-GE/G05E	Approx. 615g	with battery pack installed/ without Role Paper.

2. Imager Models without MCR

- Dimensions

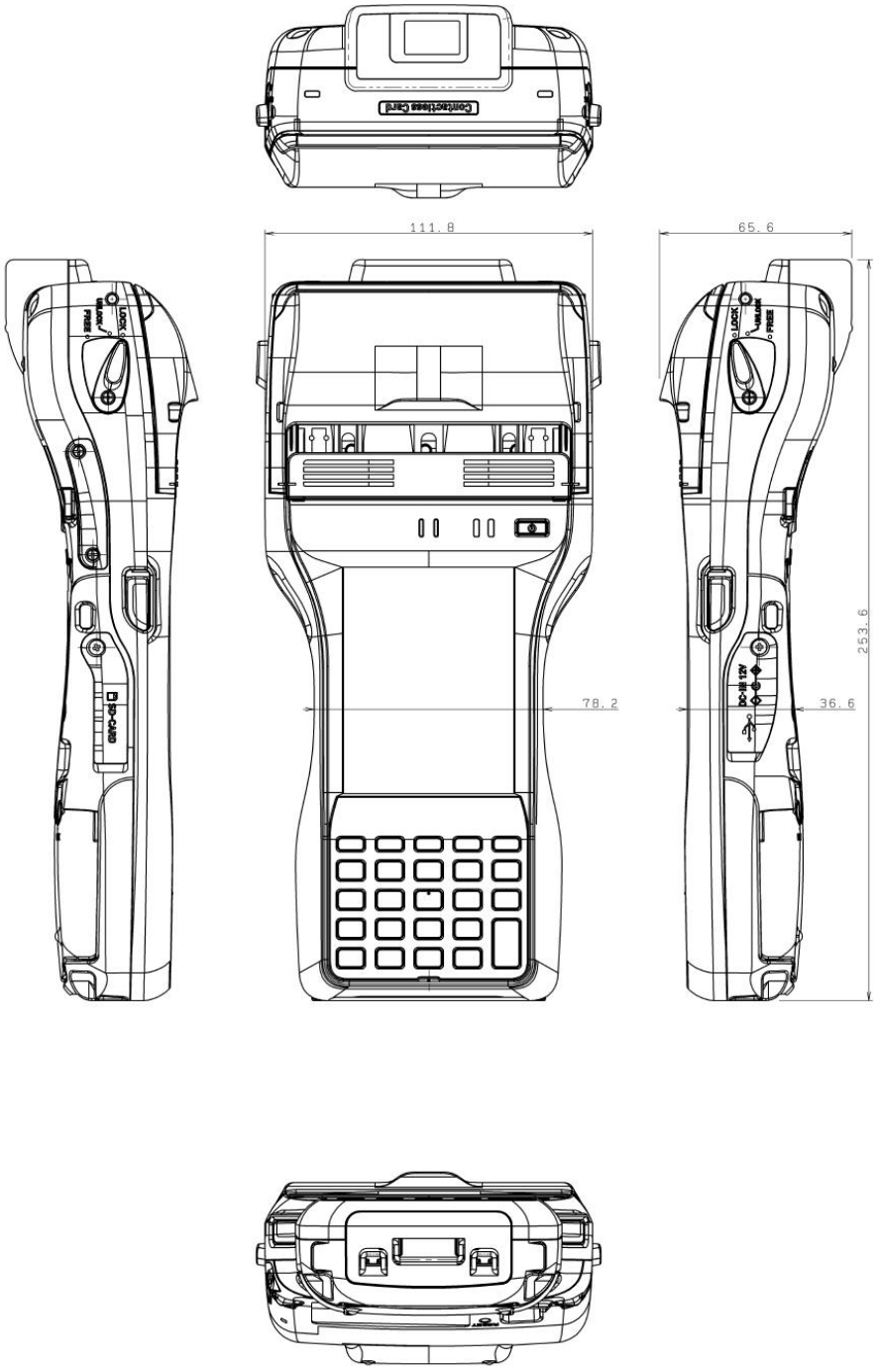


Figure 2.2 Dimensions in millimeters

- Weight

Table 2.7

Model no.	Weight	Remarks
IT-9000-C 25E	Approx. 595g	with battery pack installed/ without Role Paper.
IT-9000-20E/25E	Approx. 600g	with battery pack installed/ without Role Paper.
IT-9000-G20E/G25E	Approx. 625g	with battery pack installed/ without Role Paper.
IT-9000-GC25E	Approx. 630g	with battery pack installed/ without Role Paper.

4. Imager Models with MCR

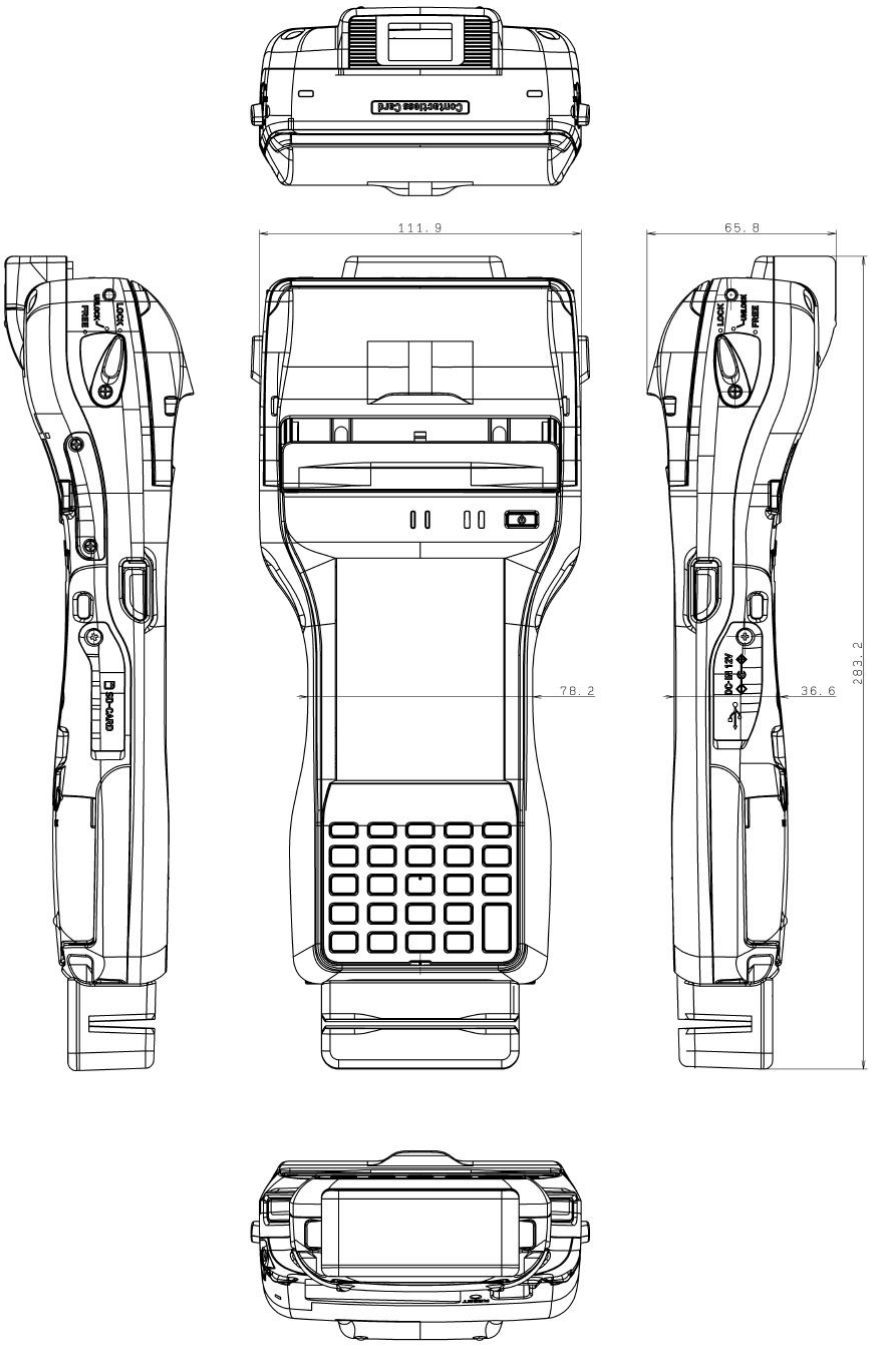


Figure 2.3 Dimensions in millimeters

- Weight

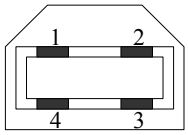
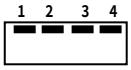
Table 2.8

Model no.	Weight	Remarks
IT-9000-GM30E/GM35E	Approx. 665g	with battery pack installed/ without Role Paper.
IT-9000-MC25E	Approx. 650g	with battery pack installed/ without Role Paper.
IT-9000-GMC25E/GMC35E	Approx. 675g	with battery pack installed/ without Role Paper.

2.2 HA-L60IO

Tables 2.9 and 2.10 and Figure 2.7 explain about the hardware specifications of the USB Cradles (HA-L60IO, HA-L60IO-CN).

Table 2.9

Item			Specification	Remark
USB	Standard		USB Ver.1.1 compatible	
	Baud rate		Max. 12 Mbps (maximum)	
	Connector		 USB connector B type	- 1 VBus - 2 – Data (D -) - 3 + Data (D+) - 4 GND
			 USB connector A type	- 1 VBus - 2 – Data (D -) - 3 + Data (D+) - 4 GND
Power from AC Adaptor	Input voltage		DC 12V±5%	
	Current consumption		Approx. 3A (maximum)	- When supplying power or transmitting data.
	Plug		EIAJ RC-5320A type 4	- Center +
	AC Adaptor		AD-S42120	- Dedicated AC adaptor
Power	USB Host	Standard	USB Ver. 1.1	
		Baud rate	12 Mbps (maximum) 1.5 Mbps (minimum)	
		Power to external device	5V±5%, 500 mA (maximum)	
	USB Client	Standard	USB Ver. 1.1	
		Baud rate	12 Mbps (maximum)	
		Pin Layout	See Figure 2.7.	
		Description	See Table 2.13.	
	Charge/ Power supply to terminal	Output voltage	DC5.0±0.25V	
		Output current	3.0 A (maximum)	
		Charge method	Constant voltage method	- Charge by integrated battery charge circuit
		Battery charge time (in hour)	Approx. 4.0 (HA-D20BAT) Approx 7.0 (HA-D21LBAT)	- Charge by integrated battery charge circuit
Dimensions			Approx. 116 (W) x 111.5 (D) x 83.5 (H) mm	
Weight			Approx. 270g	

- Pin Layout
  The pin layout below shows when the Cradle is viewed at the front.

Figure 2.7

- Pin Layout and the description

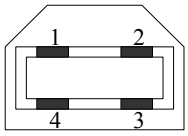
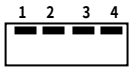
Table 2.10

Pin no.	Signal	Description	Direction
1	V CRADLE	Power supply to the terminal and charge the battery pack installed in the terminal.	-
2	USB_ID	Switch-over between USB host and USB client	OUT
3	V BUS	Power from USB cradle	IN/OUT
4	D +	USB D +	IN/OUT
5	D -	USB D -	IN/OUT
6	GND	GND	-

2.3 HA-L62IO

Tables 2.11 and 2.12 and Figure 2.8 explain about the hardware specifications of the Ethernet Cradles (HA-L62IO, HA-L62IO-CN).

Table 2.11

Item			Specification	Remark
USB	Standard		USB Ver.1.1 compatible	
	Baud rate		Max. 12 Mbps (maximum)	
	Connector		 USB connector B type	- 1 VBus - 2 – Data (D -) - 3 + Data (D+) - 4 GND
			 USB connector A type	- 1 VBus - 2 – Data (D -) - 3 + Data (D+) - 4 GND
LAN	Communication protocol		IEEE802.3 standard	
	Media type		10base-T/100base-TX auto-switched	
Power from AC Adaptor	Input voltage		DC 12V±5%	
	Current consumption		Approx. 3A (maximum)	- When supplying power or transmitting data.
	Plug		EIAJ RC-5320A type 4	- Center +
	AC Adaptor		AD-S42120	
Power	USB Host	Standard	USB Ver. 1.1	
		Baud rate	12 Mbps (maximum) 1.5 Mbps (minimum)	
		Power to external device	5V±5%, 500 mA (maximum)	
	USB Client	Standard	USB Ver. 1.1	
		Baud rate	12 Mbps (maximum)	
		Pin layout	See Figure 2.8.	
		Description	See Table 2.15.	
	Charge/ Power supply to terminal	Output voltage	DC5.0V±0.25V	
		Output current	3.0A (maximum)	

Continue.

		Charge method	Constant voltage method	- Charge by integrated battery charge circuit.
		Battery charge time (in hours)	Approx. 4.0 (HA-G20BAT)	- Charge by integrated battery charge circuit.
Dimensions			Approx. 116 (W) x 111.5 (D) x 83.5 (H) mm	
Weight			Approx. 280g	

- Pin Layout
  The pin layout below shows when the cradle is viewed at its front.

Figure 2.8

- Pin Layout and the description

Table 2.12

Pin no.	Signal	Description	Direction
1	V CRADLE	Power supply to the terminal and charge the battery pack installed in the terminal.	-
2	USB_ID	Switch-over between USB host and USB client	OUT
3	V BUS	Power from USB cradle	IN/OUT
4	D +	USB D +	IN/OUT
5	D -	USB D -	IN/OUT
6	GND	GND	-

Notes:
1. The output is made from the cradle.
2. The direction “OUT” is for USB mode, or “IN” for LAN mode.

2.4 HA-L30CHG

Table 2.13 explains about the hardware specifications of the Cradle-type Battery Chargers (HA-L30CHG, HA-L30CHG-CN).

Table 2.13

Item		Specification		Remark
Input from AC Adaptor	Input voltage	DC 5V±5%		
	Consumption current	3.0 A (maximum)		- When supplying power or transmitting data.
	Plug	EIAJ RC-5320A type 2		- Center pin +
	AC Adaptor	AD-S42120		- Dedicated AC adaptor
Pin layout		Power supply	GND	
Power supply/ Charge	Output voltage	DC5.0V±0.5V		
	Output current	3.0 A (maximum)		
	Charge method	Constant voltage		- Charge by integrated battery charge circuit
	Charge period (in hours)	Approx. 4 (HA-D20BAT) Approx 7 (HA-D21LBAT)		- Charge by integrated battery charge circuit
Dimensions		Approx. 116 (W) x 111.5 (D) x 83.5 (H) mm		
Weight		Approx. 260g		

2.5 HA-G32DCHG

Table 2.14 explains about the hardware specifications of the Dual Battery Charger (HA-D32DCHG and HA-D32DCHG-CN).

Table 2.14

Item		Specification	Remark
Battery charge	Charge method	Constant voltage constant current	
	Charge period (in hours)	Approx. 2 (for 1 pc x HA-D20BAT)	- At room temperature
		Approx. 4 (for 1 pc x HA-D21LBAT)	
		Approx. 3.5 (for 2 pcs x HA-D20BAT)	
		Approx. 7 (for 2 pcs x HA-D21LBAT)	
Required power supply		AD-S42120	- Dedicated AC adaptor
Consumption current		Approx. 0.8 A (with single HA-D32DCHG)	
		Approx. 2.4 A (with three HA-D32DCHGs connected.)	
Operating temperature		Approx. 0 to 40 ºC	
Operating humidity		30 to 80 %RH	
No. of the chargers to be connected		3 pcs x HA-D32DCHG (maximum)	
Dimensions		Approx. 110 (W) x 104 (D) x 46 (H) mm	
Weight		Approx. 195g	

2.6 HA-L35CHG

Table 2.15explains about the hardware specifications of the Car Mounted-type Battery Chargers (HA-L35CHG, HA-L35CHG-CN).

Table 2.15

Item		Specification		Remark
Input from AC Adaptor	Input voltage	DC12 to 24V±5%		
	Consumption current	3.5A (maximum)		- When supplying power
	Plug	Dedicated cable bundled with the charger		
Pin layout		Power Supply	GND	- The pin layout - "Power Supply" at left and "GND" at right - appears when the charger is placed with the front being faced upward. - See Figure 1.6.
Power supply/ Charge	Output voltage	DC 12.0V±0.5V		
	Output current	3.5A (maximum)		
	Charge method	Constant voltage (with current limitation control)		- Charge by integrated battery charge circuit
	Charge period (in hours)	Approx. 5		- Charge by integrated battery charge circuit
Dimensions		Approx. 129 (W) x 262 (D) x 82 (H) mm		
Weight		Approx. 544g		

2.7 HA-G20BAT

Table 2.16 explains about the hardware specifications of the battery packs (HA-G20BAT, HA-G20BAT-CN).

Table 2.16

Item	Specification	Remark
Rated capacity	2,000 mAh	
Rated output voltage	DC 7.4 V	
Weight	Approx. 107 g	
Dimensions	Approx. 39 (W) x 72 (D) x 21 (H) mm	

2.8 AD-S42120

Table 2.17 explains the hardware specifications of the AC Adaptors(AD-S42120C-N5,AD-S42120B-N,AD-S42120BE-CN).

Table 2.17

Parameter		Specification	Remark
Original manufacturer's model no.		SA145A-1240U-6	- By Sino-American Electronic Co., Ltd.
Type		Switching regulator	
Input requirements	Rated input voltage	100 to 240VAC	
	Input voltage tolerance	90 to 264VAC	
	Nominal frequency	50 or 60 Hz	
	Frequency tolerance	47 to 63 Hz	
	Input current	1200mA (maximum)	- At input 100VAC/50Hz with full load
Output requirements	Rated output voltage	DC12V	
	Rated output current	DC3.5A	
	Rated output power	42W	
Dimensions	Approx. 111 (D) x 50 (W) x 31 (H) mm		
Weight	Approx. 360 g		

3. Product Identification and Reference Numbers

On the back of the terminal and the dedicated options, there is a bar code and numbers printed on label as shown in the following figure. This bar code is represented by 15 digits of Code128 symbology and by alphanumeric characters beneath the bar code. The numbers from 1 to 9 in the figure represent identification and references of individual terminal. The numbers from 10 to 14 represent a manufacturing reference which is reserved by the manufacturer. See the figure for each meaning.

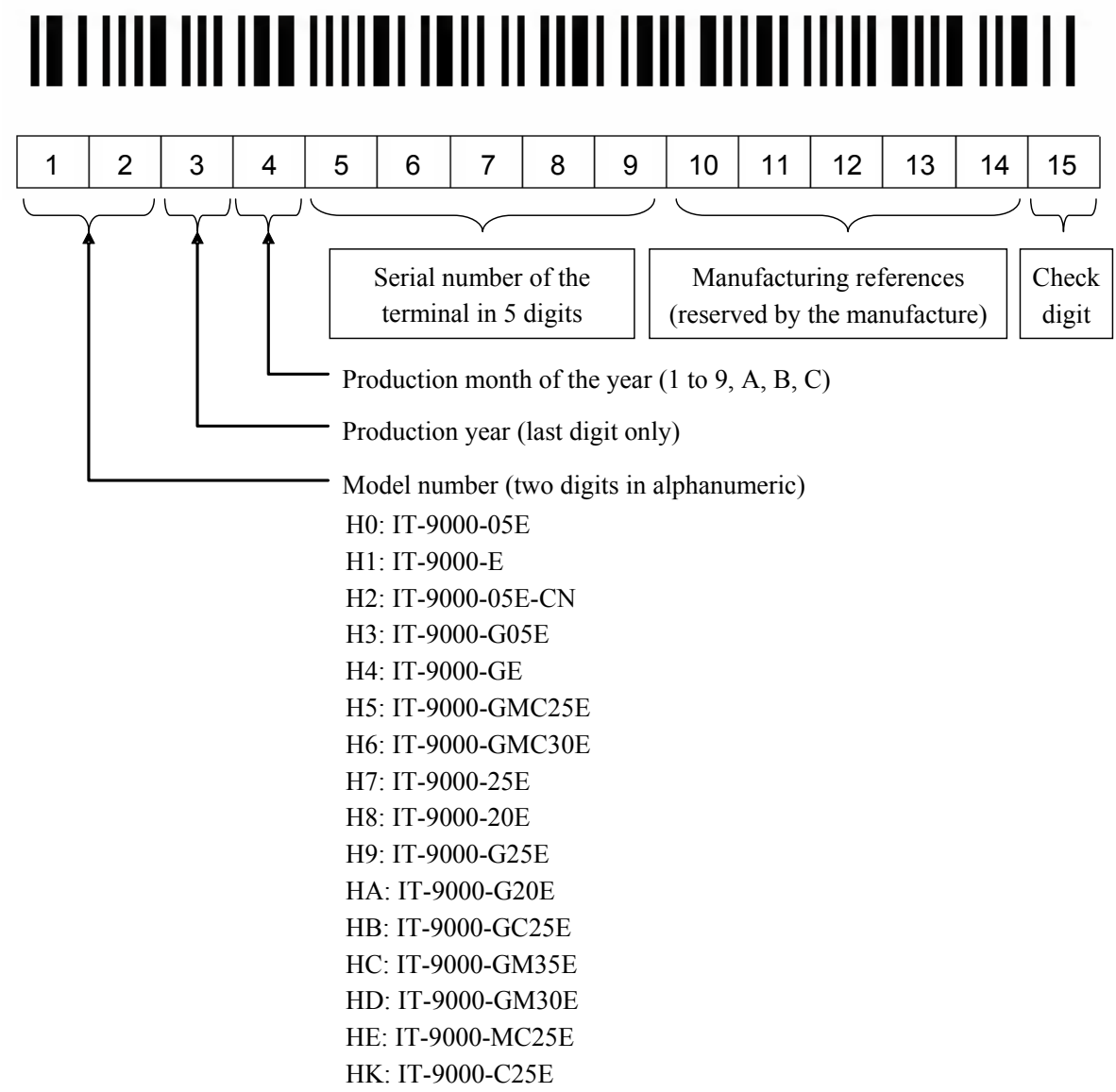


Figure 3.1

4. Quality References

This chapter describes about references of the IT-9000 and its dedicated options concerned with environmental performance, regulatory compliance, mechanical and electric durability, etc.

4.1 Environmental Performances

4.1.1 IT-9000

Table 4.1 explains about the environment performances on all models of IT-9000 series.

Table 4.1

Item		Specification	Remark/Condition
Temperature			
	Operation	-20 ºC to 50 ºC	0 to 40 ºC for charging battery
	For quality print	0 to 50 ºC	F220VP,HA220AA,FP235
		5 to 35 ºC	HW54S
		-5 to 50 ºC	ODT60TC-RAK
	Non-operation	-20 ºC to 60 ºC	
Humidity			
	Operation	10 % to 90 %RH	- No condensation
	Non-operation	5 % to 90 %RH	
Storage			
	Temperature	-20 ºC to 60 ºC	
	Humidity	5 % to 90 %RH	
Dust and water-splash proof			
		IP54 level	- Compliant with IEC60529 standard

Note

It is recommended to check the print quality in the environment including at low temperature where the terminal is operated before starting the use.

4.1.2 HA-L60IO

Table 4.2 explains about the environment performances on the USB Cradles (HA-L60IO, HA-L60IO-CN).

Table 4.2

Item		Specification	Remark/Condition
Temperature			
	Operation	0 ℃ to 40 ℃	
	Non-operation	-20 ℃ to 60 ℃	
Humidity			
	Operation	10 % to 90 %RH	- No condensation
	Non-operation	5 % to 90 %RH	
Storage in carton box			
	Temperature	-20 ℃ to 60 ℃	
	Humidity	10 % to 90 %RH	- No condensation
Dust and water-splash proof			
		Not applicable	

4.1.3 HA-L62IO

Table 4.3 explains about the environment performances on the Ethernet Cradles (HA-L62IO, HA-L62IO-CN).

Table 4.3

Item		Specification	Remark/Condition
Temperature			
	Operation	0 ℃ to 40 ℃	
	Non-operation	-20 ℃ to 60 ℃	
Humidity			
	Operation	10 % to 80 %RH	- No condensation
	Non-operation	5 % to 90 %RH	
Storage in carton box			
	Temperature	-20 ℃ to 60 ℃	
	Humidity	10 % to 90 %RH	- No condensation
Dust and water-splash proof			
		Not applicable	

4.1.4 HA-L30CHG

Table 4.4 explains about the environment performances on the Cradle-type Battery Chargers (HA-L30CHG, HA-L30CHG-CN).

Table 4.4

Item		Specification	Remark/Condition
Temperature			
	Operation	0 ℃ to 40 ℃	
	Non-operation	-20 ℃ to 70 ℃	
Humidity			
	Operation	10 % to 80 %RH	- No condensation
	Non-operation	5 % to 90 %RH	
Storage in carton box			
	Temperature	-20 ℃ to 60 ℃	
	Humidity	10 % to 90 %RH	- No condensation
Dust and water-splash proof			
		Not applicable	

4.1.5 HA-G32DCHG

Table 4.5 explains about the environment performances on the Dual Battery Chargers (HA-G32DCHG, HA-G32DCHG-CN).

Table 4.5

Item		Specification	Remark/Condition
Temperature			
	Operation	0 ℃ to 40 ℃	
	Non-operation	-20 ℃ to 60 ℃	
Humidity			
	Operation	30 % to 80 %RH	- No condensation
	Non-operation	10 % to 90 %RH	
Storage in carton box			
	Temperature	-20 ℃ to 60 ℃	
	Humidity	10 % to 90 %RH	- No condensation
Dust and water-splash proof			
		Not applicable	

4.1.6 HA-L35CHG

Table 4.6 explains about the environment performances on the Car Mounted-type Battery Chargers (HA-L35CHG, HA-L35CHG-CN).

Table 4.6

Item		Specification	Remark/Condition
Temperature			
	Operation	0 ℃ to 40 ℃	-10℃ to 50℃ while supplying power to the terminal.
	Non-operation	-20 ℃ to 70 ℃	
Humidity			
	Operation	10 % to 80 %RH	- No condensation
	Non-operation	5 % to 90 %RH	
Storage in carton box			
	Temperature	-20 ℃ to 60 ℃	
	Humidity	10 % to 90 %RH	- No condensation
Dust and water-splash proof			
		Not applicable	

4.1.7 HA-G20BAT

Table 4.7 explains environment performances on the Battery Packs (HA-G20BAT, HA-G20BAT-CN,).

Table 4.7

Item		Specification	Remark/Condition
Temperature			
	Operation	Compatible with the temperature range for the terminal during discharge, or with that of the battery chargers during charge. See Table 4.1 for discharge. Or, any one of Tables 4.2 to 4.6 for charge.	
	Storage	Compatible with the temperature range for the terminal. See Table 4.1.	
Humidity			
	Operation	Compatible with the humidity range for the terminal during discharge, or with that of the battery chargers during charge. See Table 4.1 for discharge. Or, any one of Tables 4.2 to 4.6 for charge.	
	Storage	Compatible with the humidity range for the terminal. See Table 4.1.	
Storage in carton box			
	Temperature	-25 to 30 ºC	- The period of storage is recommended within one year.
	Humidity	90 %RH or less	
Water-splash resistance			
		Not applicable.	

4.1.8 AD-S42120

Table 4.8 explains environmental performances on the AC Adaptors (AD-S42120C-N5,AD-S42120B-N,AD-S42120BE-CN) .

Table 4.8

Item		Specification	Remark/Condition
Temperature			
	Operation	0 to 40 ºC	
	Storage	-20 to 60 ºC	
Humidity			
	Operation	20 to 80 %RH	- No condensation
	Storage	10 to 90 %RH	

4.2 Electrical Performances

4.2.1 IT-9000

Table 4.9 explains about electric performances on all models of IT-9000 series including the models with "-CN" denotation.

Table 4.9

Item		Specification	Remark/Condition
Current consumption		DC1.8A:IT-9000-E/05E/05E-CN/20E/25E DC1.9A:IT-9000-GE/G05E/GMC25E/GMC30E/G20E/G25E/GM30E/GM35E DC1.7A: IT-9000-MC25E/C-25E	
Anti-static strength			
	Malfunction	±4 KV (In contact) ±8 KV (In air)	- 150 pF, 330ohm
	Destruction	±12 KV	

4.2.2 HA-L60IO

Table 4.10 explains about electric performances on the USB Cradles (HA-L60IO, HA-L60IO-CN).

Table 4.10

Item	Specification	Remark/Condition
Input voltage	DC12V±5%	
Anti-static strength		
In contact	±4 KV	- 150 pF, 330 ohm
In air	±8 KV	
Instant power interruption	10 milliseconds or less	
Line noise strength		
Malfunction	1,000 V	- Pulse frequency : 5KHz - Burst cycle : 300 milliseconds - Number of pulses : 75 - Burst interval : 15 milliseconds

4.2.3 HA-L62IO

Table 4.11 explains about electric performances on the Ethernet Cradles (HA-L62IO, HA-L62IO-CN).

Table 4.11

Item	Specification	Remark/Condition
Input voltage	DC12 V±5%	
Anti-static strength		
In contact	±4 KV	- 150pF, 330 ohm
In air	±8 KV	
Instant power interruption	10 milliseconds or less	
Line noise strength		
Malfunction	1,000V	- Pulse frequency : 5KHz - Burst cycle : 300 milliseconds - Number of pulses : 75 - Burst interval : 15 milliseconds

4.2.4 HA-L30CHG

Table 4.12 explains about electric performances on the Cradle-type Battery Chargers (HA-L30CHG, HA-L30CHG-CN).

Table 4.12

Item	Specification	Remark/Condition
Input voltage	DC12V±5%	
Anti-static strength		
In contact	±4 KV	- 150 pF, 330 ohm
In air	±8 KV	
Instant power interruption	10 milliseconds or less	
Line noise strength		
Malfunction	1,000 V	- Pulse frequency : 5 KHz - Burst cycle : 300 milliseconds - Number of pulses : 75 - Burst interval : 15 milliseconds

4.2.5 HA-G32DCHG

Table 4.13 explains about electric performances on the Dual Battery Chargers (HA-G32DCHG, HA-G32DCHG-CN).

Table 4.13

Item	Specification	Remark/Condition
Power consumption		
	Approximately 0.03A	Without battery
	Approximately 0.8A	At charging with battery
Input voltage	DC12V±5%	
Anti-static strength		
In contact	±6 KV	- 150 pF, 330 ohm
In air	±8 KV	
Line noise strength		
Malfunction	1,000 V	- Pulse frequency : 5 KHz - Burst cycle : 300 milliseconds - Number of pulses : 75 - Burst interval : 15 milliseconds

4.2.6 HA-L35CHG

Table 4.14 explains about electric performances on the Car Mounted-type Battery Chargers (HA-L35CHG, HA-L35CHG-CN).

Table 4.14

Item		Specification	Remark/Condition
Input voltage		DC12 to 24V±5%	
Anti-static strength			
	In contact	±4 KV	- 150 pF, 330 ohm
	In air	±8 KV	
Instant power interruption		10 milliseconds or less	
Line noise strength			
	Malfunction	1,000 V	- Pulse frequency : 5 KHz - Burst cycle : 300 milliseconds - Number of pulses : 75 - Burst interval : 15 milliseconds

4.2.7 HA-G20BAT

The following table explains electrical performances on the Battery Packs (HA-G20BAT, HA-G20BAT-CN).

Table 4.15

Item		Specification	Remark/Condition
Anti-static strength			
	Malfunction	6 KV (contact)/8KV (in air)	
	Destruction	12 KV (contact, in air)	

4.2.8 AD-S42120

Table 4.16 explains electrical performance on the AC Adaptors (AD-S42120C-N5, AD-S42120B-N AD-S42120BE-CN).

Table 4.16

Item		Specification	Remark/Condition
Immunity Test			
	Electrostatic Discharge	Contact: ±4KV Air: ±8KV	- IEC61000-4-2
	Electromagnetic radiation	Frequency: 80 to 1000MHz Field Strength: 3V/m	- IEC61000-4-4
	Burst noise	AC input: ±1KV	- IEC61000-4-4
	Surge Noise	L1-L2: ±1KV L1/L2-PE: ±2KV	- IEC61000-4-5

4.3 Mechanical Performances

4.3.1 IT-9000

Table 4.17 explains about mechanical performances on all models of IT-9000 series including the models with "-CN" denotation.

Table 4.17

Item	Specification	Remark/Condition
Resistance to drop impact (height)	150 cm (see note)	- 2 cycles on each of 6 faces and 4 corners.
Resistance to drop impact in carton box (height)	70 cm (in individual carton box)	- 1 cycle on each of 6 faces, 1 corner and three edges.
	70 cm (in master carton box)	
Resistance to vibration	3.0 G	- 5 to 200 Hz - In X, Y directions : 2 hours each - In Z direction : 4 hours

Note:
The drop durability height is a measured value resulting from actual testing. It does not necessarily guarantee the product from damage.

4.3.2 HA-L60IO

Table 4.18 explains about mechanical performances on the USB Cradles (HA-L60IO, HA-L60IO-CN).

Table 4.18

Item		Specification	Remark/Condition
Resistance to vibration		1.5 G or less	- 10 to 55 Hz - In X, Y, and Z directions - Reciprocally for 30 minutes - While the power is turned on and the terminal is not being mounted on the cradle. - No communication
Resistance to vibration (in carton box)		1.5 G or less	- 10 to 55 Hz - In X, Y, and Z directions - Reciprocally for 30 minutes
Resistance to drop impact			
	In bare condition	75 cm	- 1 cycle on each of 6 faces onto concrete floor
	In individual carton	70 cm or less	- 1 cycle on each of 6 faces, 1 corner and 3 edges
	In master carton	50 cm or less	

4.3.3 HA-L62IO

Table 4.19 explains about mechanical performances on the Ethernet Cradles (HA-L62IO, HA-L62IO-CN).

Table 4.19

Item		Specification	Remark/Condition
Resistance to vibration		1.5 G or less	- 10 to 55 Hz - In X, Y, and Z directions - Reciprocally for 30 minutes - While the power is turned on and the terminal is not being mounted on the cradle. - No communication
Resistance to vibration (in carton box)		1.5 G or less	- 10 to 55 Hz - In X, Y, and Z directions - Reciprocally for 30 minutes
Resistance to drop impact			
	In bare condition	70 cm	- 1 cycle on each of 6 faces onto concrete floor
	In individual carton	70 cm or less	- 1 cycle on each of 6 faces, 1 corner and 3 edges
	In master carton	50 cm or less	

4.3.4 HA-L30CHG

Table 4.20 explains about mechanical performances on the Cradle-type Battery Chargers (HA-L30CHG, HA-GL0CHG-CN).

Table 4.20

Item		Specification	Remark/Condition
Resistance to vibration		1.5 G or less	- 10 to 55 Hz - In X, Y, and Z directions - Reciprocally for 30 minutes - While the power is turned on and the terminal is not being mounted on the charger. - No communication
Resistance to vibration (in carton box)		1.5 G or less	- 10 to 55 Hz - In X, Y, and Z directions - Reciprocally for 30 minutes
Resistance to impact			
	In bare condition	70 cm	- 1 cycle on each of 6 faces onto concrete floor
	In individual carton	70 cm or less	- 1 cycle on each of 6 faces, 1 corner and 3 edges
	In master carton	50 cm or less	

4.3.5 HA-G32DCHG

Table 4.21 explains about mechanical performances on the Dual Battery Chargers (HA-G32DCHG, HA-G32DCHG-CN).

Table 4.21

Item		Specification	Remark/Condition
Resistance to vibration		1.5 G or less	- 10 to 55 Hz - In X, Y, and Z directions - Reciprocally for 15 minutes - While the power is turned off.
Resistance to vibration (in carton box)		1.5 G or less	- 10 to 55 Hz - In X, Y, and Z directions - Reciprocally for 15 minutes
Resistance to impact			
	In bare condition	70 cm	- 1 cycle on each of 6 faces and 4 edges onto concrete floor
	In individual carton	70 cm or less	- 1 cycle on each of 6 faces, 1 corner and 3 edges
	In master carton	60 cm or less	

4.3.6 HA-L35CHG

Table 4.22 explains about mechanical performances on the Car Mounted-type Battery Chargers (HA-L35CHG, HA-HL5CHG-CN).

Table 4.22

Item		Specification	Remark/Condition
Resistance to vibration		3.0 G or less	- 5 to 200 Hz - In X, Y directions - 2 hours
			- 5 to 200 Hz - In Z direction - 4 hours
Resistance to vibration (in carton box)		1.5 G or less	- 10 to 55 Hz - In X, Y, and Z directions - Reciprocally for 30 minutes
Resistance to impact			
	In bare condition	70 cm	- 1 cycle on each of 6 faces and four edges onto concrete
	In individual carton	70 cm or less	- 1 cycle on each of 6 faces, 1 corner and 3 edges
	In master carton	50 cm or less	

4.3.7 HA-G20BAT

Table 4.23 explains about mechanical performances on the Battery Packs (HA-G20BAT, HA-G20BAT-CN).

Table 4.23

Item		Specification	Remark/Condition
Resistance to vibration		1.5 G or less	- 10 to 55 Hz - In X, Y, and Z directions - Reciprocally for 30 minutes
Impact durability (in height of fall)			
	In bare condition	100 cm or less	- 1 cycle on each of 6 faces onto P-tile surface.
	In individual carton box	70 cm or less	- 1 on each of 6 faces, 1 corner and 3 edges onto concrete surface.
	In master carton box	70 cm or less	

4.3.8 AD-S42120

Table 4.24 explains mechanical performances on the AC Adaptors (AD-S42120C-N5,AD-S42120B-N,AD-S42120BE-CN) .

Table 4.24

Item		Specification	Remark/Condition
Resistance to vibration		0.5 G or less	- 10 to 100 Hz - In X, Y, and Z directions - Reciprocally for 10 minutes
Impact durability (in height of fall)			
	In bare condition	70 cm or less	- 1 cycle on each of 6 faces onto P-tile surface.
	In individual carton box	70 cm or less	- 1 cycle on each of 6 faces, 1 corner and 3 edges onto concrete surface.
	In master carton box	70 cm or less	

4.4 Reliability

4.4.1 IT-9000

Table 4.25 explains about reliability on all models of IT-9000 series including models with "-CN" denotation.

Table 4.25

Item			Specification	Remark/Condition
Service life				
	Electronic Components MTBF		21,000 hours	- Main PCB + Sub PCB + Key PCB
	Backlight		50,000 hours	- Half-value period at 25°C
	LCD		50,000 hours	- 8 hours/day x 365 days/year x 5 years
	Discharge/charge cycle longevity of battery pack		500 times	- 50% or more of the initial capacity
	Battery pack storage period (recommended)		One year or less	- At temperature in the range of -25 ºC to 30 ºC - At 80% of the battery's capacity recovery rate
	Discharge/charge cycle longevity of memory backup battery		20,000 times	- Memory backup for a period of 10 minutes
			50 times	- Memory backup until the cut-off voltage level
	Key input durability	Reset switch	1,000 times	
		Trigger keys	1,000,000 times	- 500 times/day x 365 days/year x 5 years
		Keys (except Side keys)	1,000,000 times	- 500 times/day x 365 days/year x 5 years
	Connector durability	USD	5,000 times	-
		SD	5,000 times	-
	SIM/SAM card install/remove		10,000 times	
	MCR read		200,000 times	-
	Camera		102,596 hours	- MTTF
	LED light		10,000 times	
	Splash Cover		1,200 times	-
	Printer	Printer life	50km	- Paper printing distance (Printing Rate 25%)
		The cutting number of times	15,0000 times	- Indoor use,clean every 1000times
	C-MOS Imager		70,000 hours	-
	Mounting/removing	Battery pack	4,000 times	- 2 times/day x 365 days/year x 5 years
		DC Jack	4,000 times	- 2 times/day x 365 days/year x 5 years
		On HA-L30CHG	15,000 times	- 2 terminals share same HA-L30CHG x 4 times/day x 365 days/year x 5 years
		On HA-L35CHG	91,250 times	- 50 accesses/day x 365 days/year x 5 years
		On HA-L62IO	15,000 times	- 2 terminals share same HA-L62IO x 4 times/day x 365 days/year x 5 years
		On HA-L60IO	15,000 times	- 2 terminals share same HA-L60IO x 4 times/day x 365 days/year x 5 years

4.4.2 HA-L60IO

Table 4.26 explains about reliability on the USB Cradles (HA-L60IO, HA-L60IO-CN).

Table 4.26

Item		Specification	Remark / Condition
MTBF for electronic parts		100,000 hours	
Mounting the terminal on the cradle and removing		15,000 times	
Power switch		5,000 times	
Installing and removing	USB Client port connector	260 times	
	USB Host port connector	260 times	
Installing AC adaptor to and removing from	AC adaptor jack	100 times	

4.4.3 HA-L62IO

Table 4.27 explains about reliability on the Ethernet Cradles (HA-L62IO, HA-L62IO-CN).

Table 4.27

Item		Specification	Remark / Condition
MTBF for electronic parts		50,000 hours	
Mounting the terminal and removing		15,000 times	
Switching	Selector switch (USB Host or USB Client)	500 times	- One reciprocal switching as one time
Installing and removing	USB client port's connector	260 times	
	USB host port's connector	260 times	
	LAN port's connector	100 times	
Installing AC adaptor to and removing from	AC adaptor jack	100 times	
Power switch		5,000 times	

4.4.4 HA-L30CHG

Table 4.28 explains about reliability on the Cradle-type Battery Chargers (HA-L30CHG, HA-L30CHG-CN).

Table 4.28

Item	Specification	Remark/Condition
MTBF for electronic parts	100,000 hours	
Mounting the terminal and removing from	15,000 times	
Connecting to the joint connector and removing from	100 times	

4.4.5 HA-G32DCHG

Table 4.29 explains about reliability on the Dual Battery Chargers (HA-G32DCHG, HA-G32DCHG-CN).

Table 4.29

Item		Specification	Remark / Condition
MTBF for electronic parts		50,000 hours	
Mounting HA-G20BAT and removing it from		5,000 times	
Connecting to the joint connector and removing from		250 times	
Installing AC adaptor to and removing from	AC adaptor jack	1,500 times	

4.4.6 HA-L35CHG

Table 4.30 explains about reliability on the Car Mounted-type Battery Chargers (HA-L35CHG, HA-L35CHG-CN).

Table 4.30

Item		Specification	Remark/Condition
MTBF for electronic parts		100,000 hours	
Mounting the terminal on and removing from		100,000 times	
Installing cable to and removing from	DC jack	100 times	

4.4.7 HA-G20BAT

Table 4.31 explains about reliability on the Battery Packs (HA-G20LBAT, HA-G20LBAT-CN).

Table 4.31

Item	Specification	Remark / Condition
Battery charge-discharge cyclic life	500 cycles	- Environment temperature : ordinary - The capacity after 500 cycles remains 50% of its initial capacity or more.

4.4.8 AD-S42120

Table 4.32 explains about reliability on the AC Adaptors(AD-S42120C-N5,AD-S42120B-N,AD-S42120BE-CN).

Table 4.32

Item	Specification	Remark / Condition
MTBF	100,000 hours	- At 25 ºC MIL-HDBK-217F

4.5 Compliance

4.5.1 IT-9000

The following tables, Tables 4.33 , explain about compliance with the relevant regulatory standards and requirements for all models of IT-9000 series PDA.

Table 4.33

Area	Category	Standard/Requirement	IT-9000			
			R-05	RGC-05	R-15	RC-15
World	Safety	IEC60950-1 Edition 2	√	√	√	√
	Laser/LED	IEC60825-1	-	-	√	√
	Environment durability (Dust and water-splash)	IEC60529, Level IP54	√	√	√	√
	Bluetooth logo certification					
	Class1	PRD2.0	-	-	-	-
	Class2	PRD2.0	√	√	√	√
Europe	Safety	EN60950-1	√	√	√	√
	Laser/LED	EN60825-1	-	-	√	√
	WAN protocol (2G/3G) GCF	GCF-CC	-	√	-	-
	Radio (R&TTE Directive)					
	WLAN/Bluetooth					
	ERM	EN300 328	√	√	√	√
	EMC	EN301 489-17	√	√	√	√
	SAR	EN62311	√	√	√	√
	GSM(2G)					
	ERM	EN301 511	-	√	-	-
	EMC	EN301 489-7	-	√	-	-
	SAR	EN50360	-	√	-	-
	WCDMA(3G)					
	ERM	EN300 908-2	-	√	-	-
	EMC	EN301 489-24	-	√	-	-
	SAR	EN50360	-	√	-	-
	NFC (Near Field Communication)					
	ERM	EN300 330	√	√	√	√
	EMC	EN301 489-3	√	√	√	√
	GPS					
	ERM	EN300 440	-	√	-	-
	EMC	EN301 489-1	-	√	-	-

ERM; Electromagnetic Compatibility and Radio Spectrum Matters

EMC; Electromagnetic Compatibility

4.5.2 HA-L60IO

Table 4.34 explains about compliance with the relevant regulatory standards and requirements for the USB Cradles (HA-L60IO, HA-L60IO-CN).

Table 4.34

Area	Category			Standard/Requirement	Remark
World	Safety			IEC60950-1	
	Vehicle standard	E Mark		ECEReg.10	
USA	EMI	FCC		CFR 47 Part 15 Subpart B	
	Safety	UL	Vehicles	UL 2089	
			IT Devices	UL 60950-1	
Canada	WLAN standard	EMI		ICES-003	
	Safety	CSA		cUL 60950-1	
Europe	Safety	LVD Directive		EN60950-1	
	EMS	EMC Directive (2004/108/EC)		EN55024	
	EMI			EN55022	
				EN61000-3-2	
				EN61000-3-3	
		Vehicle Directive		ECE Reg.10	
China	CCC	Safety		GB4943	
		EMI		GB9254	
		Harmonic		GB17625.1	
Korea	EMC Standard	Radio Law		RRL notice	
Australia/New Zealand	C-Tick	EMI		AS/NZS CISPR22	

4.5.3 HA-L62IO

Table 4.35 explains about compliance with the relevant regulatory standards and requirements for the Ethernet Cradles (HA-L62IO, HA-L62IO-CN).

Table 4.35

Area	Category			Standard/Requirement	Remark
World	Safety			IEC60950-1	
	Vehicle standard	E Mark		ECEReg.10	
USA	EMI	FCC		CFR 47 Part 15 Subpart B	
	Safety	UL	Vehicles	UL2089	
			IT Devices	UL60950-1	
Canada	WLAN standard	EMI		ICES-003	
	Safety	CSA		cUL 60950-1	
Europe	Safety	LVD Directive		EN60950-1	
	EMS	EMC Directive (2004/108/EC)		EN55024	
	EMI			EN55022	
				EN61000-3-2	
				EN61000-3-3	
		Vehicle Directive		ECE Reg.10	
China	CCC	Safety		GB4943	
		EMI		GB9254	
		Harmonic		GB17625.1	
Korea	EMC standard	Radio Law		RRL notice	
Australia /New Zealand	C-Tick	EMI		AS/NZS CISPR22	

4.5.4 HA-L30CHG

Table 4.36 explains about compliance with the relevant regulatory standards and requirements for the Cradle-type Battery Chargers (HA-L30CHG, HA-L30CHG-CN).

Table 4.36

Area	Category			Standard/Requirement	Remark
World	Safety			IEC60950-1	
	Vehicle standard	E Mark		ECEReg.10	
USA	EMI	FCC		CFR 47 Part 15 Subpart B	
	Safety	UL	Vehicles	UL2089	
			IT Devices	UL60950-1	
Canada	WLAN standard	EMI		ICES-003	
	Safety	CSA		cUL 60950-1	
Europe	Safety	LVD Directive		EN60950-1	
	EMS	EMC Directive (2004/108/EC)		EN55024	
	EMI			EN55022	
				EN61000-3-2	
				EN61000-3-3	
		Vehicles Directive		ECE Reg.10	
China	CCC	Safety		GB4943	
		EMI		GB9254	
		Harmonic		GB17625.1	
Korea	EMC standard	Radio Law		RRL notice	
Australia/New Zealand	C-Tick	EMI		AS/NZS CISPR22	

4.5.5 HA-G32DCHG

Table 4.33.27 explains about the compliance with the required European standards for the Dual Battery Charger (HA-G32DCHG, HA-G32DCHG-CN).

Table 4.37

Model no.	Directive 2004/108/EC	
	EMC EN55022:1998	EMI EN55024:1998
HA-G32DCHG	Yes	Yes

4.5.6 HA-L35CHG

Table 4.38 explains about compliance with the relevant regulatory standards and requirements for the Car Mounted-type Battery Chargers (HA-L35CHG, HA-L35CHG-CN).

Table 4.38

Area	Category			Standard/Requirement	Remark
World	Safety			IEC60950-1	
	Vehicle standard	E Mark		ECEReg.10	
USA	EMI	FCC		CFR 47 Part 15 Subpart B	
	Safety	UL	Vehicles	UL2089	
			IT Devices	UL60950-1	
Canada	WLAN standard	EMI		ICES-003	
	Safety	CSA		cUL 60950-1	
Europe	Safety	LVD Directive		EN60950-1	
	EMS	EMC Directive (2004/108/EC)		EN55024	
	EMI			EN55022	
				EN61000-3-2	
				EN61000-3-3	
		Vehicles Directive		ECE Reg.10	
China	CCC	Safety		GB4943	
		EMI		GB9254	
		Harmonic		GB17625.1	
Korea	EMC standard	Radio Law		RRL notice	
Australia/New Zealand	C-Tick	EMI		AS/NZS CISPR22	

4.5.7 HA-G20BAT

Table 4.39 explains about compliance with applicable requirements for the Battery Packs (HA-G20BAT, HA-G20BAT-CN).

Table 4.39

Category	Requirement	Remark
Safety	UL1642	- Cell
	UL60950-1	- Battery Pack

4.5.8 AD-S42120

Table 4.40 explains about compliance with the relevant regulatory standards and requirements for the AC Adaptors (AD-S42120C-N5,AD-S42120B-N,AD-S42120BE-CN).

Table 4.40

Category	Standard/Requirement	Remark
EMC	UL60950 3rd edition	- USA
	CAN/CSA C222 NO.60950-00 1st edition	- Canada
	EN60950-1:2001+A11	- EU
	AS/NZS60950-1:2000	- Australia, New Zealand
	IEC60950-1:2001	- CB certificate
	K60950-1	- Korea
	CNS14336 (94)	- Taiwan
	GB4943-2001	- China
Safety	CFR47 FCC Part 15 Subpart B	- USA, Canada
	EN55022:2006	- EU
	EN55024:1998+A1:2001+A2:2003	- EU
	EN61000-3-2:2000+A2:2005	- EU
	EN61000-3-3:1995+A1:2001+A2:2005	- EU
	GB9254-1998	- China
	GB17625.1-2003	- China
	CNS13438 (95)	- Taiwan
	AZ/NZS CISPR22	- Australia, New Zealand

4.6 Performance Reference

This section explains performance references with the with C-MOS imager (model dependent) which should be utilized by the user prior to employment of the IT-9000 series terminals for the capability of scanning bar codes.

4.6.1 Scanning by C-MOS Imager

Recommended No. of Digits

"B: Recommended no. of digits" in the table below is defined for consideration on the following.

- Each no. of digits can allow 50 mm or far away of read distance (if the read distance is 50 mm or far away).
- Each "B: Recommended no. of digits" is no. of digits that can be read without having any difficulty and that it is set for an optimum operation performance. For any symbology (= resolution in the table) with its readable range 50mm or less, "A: no. of digits in close distance" and "B: Recommended no. of digits" is the same.

Table 4.41 List of the specifications

Symbology		Resolution	Reading Range	A	B	C	Remarks
1D	Code39	6mil(0.15mm)	85 to 115mm	25	25	26	
		8mil(0.20mm)	70 to 150mm	14	19	27	
		10mil(0.254mm)	65 to 170mm	9	18	24	
		13mil(0.33mm)	60 to 200mm	6	17	22	
		15mil(0.38mm)	45 to 205mm	2	15	19	
		20mil(0.5mm)	70 to 260mm	3	16	19	
		40mil(1.0mm)	110 to 410mm	2	13	14	
	UPC	13mil(0.33mm)	60 to 195mm	11	11	11	
2D (Stack)	PDF417	6.6mil(0.168mm)	80 to 130mm	2616	2616	2616	For ECL4, 2616 digits are maximum due to the limitation.
		8mil(0.20mm)	70 to 150mm	1366	2616	2616	
		10mil(0.254mm)	65 to 170mm	642	2482	2616	
		15mil(0.38mm)	65 to 215mm	105	2108	2616	
		20mil(0.5mm)	70 to 260mm	5	1833	2522	
2D (Matrix)	DataMatrix	10mil(0.254mm)	75 to 135mm	1500	1500	1500	For ECC200, 1500 digits are maximum due to the software.
		13mil(0.33mm)	65 to 155mm	1152	1500	1500	
		15mil(0.38mm)	55 to 165mm	560	1500	1500	
		20mil(0.5mm)	70 to 195mm	408	1500	1500	
	QR	10mil(0.254mm)	75 to135mm	2857	3035	3500	For model 2, 3500 digits are maximum due to the software.
		13mil(0.33mm)	65 to 155mm	1212	2701	3500	
		15mil(0.38mm)	60 to 160mm	691	2188	3500	
		20mil(0.5mm)	70 to 195mm	513	2188	3486	
	Maxicode	35mil(0.889mm)	60 to 220mm	138	138	138	

Continue.

A: No. of maximum digits in close distance
B: Recommended no. of digits
C: Maximum no. of digits

Angle			
Pitch angle	1D (Code39 10mil (0.25mm))	±35 degree	At 110 mm away from the IT-9000.
	2D Stack type (PDF417 10mil(0.25mm))	±35 degree	At 110 mm away from the IT-9000.
	2D Matrix type (Aztec 20mil(0.5mm))	±35 degree	At 110 mm away from the IT-9000.
Skew angle	1D (Code39 10mil 0.25mm))	±40 degree	At 110 mm away from the IT-9000.
	2D Stack type (PDF417 10mil(0.25mm))	±40 degree	At 110 mm away from the IT-9000.
	2D Matrix type (Aztec 20mil(0.5mm))	±35 degree	At 110 mm away from the IT-9000.
Dead zone		±5 degree (Pitch, Skew)	At 110 mm away from the IT-9000.
Tilt angle	1D (Code39 10mil (0.25mm))	360 degree	At 110 mm away from the IT-9000.
	2D Stack type (PDF417 10mil(0.25mm))	360 degree	At 110 mm away from the IT-9000.
	2DMatrix type (Aztec 20mil(0.5mm))	360 degree	At 110 mm away from the IT-9000.
Lighting			
	100 to 80,000Lux		
PCS			
	1D (Code39 10mil (0.25mm))	0.45 or more	5 digits
	2D Stacked (PDF417 10mil (0.25mm))	0.45 or more	100 digits
	2D Matrix (Maxi Code 35mil (0.889mm))	0.45 or more	52 digits
Viewing angle			
	V_Angle = 26 degree H_Angle = 35 degree		
Operation temperature			
	High	50°C	
	Low	-10°C	See note 5.

Notes:

1. All the specifications in the table are defined under the basic condition. See next page.
2. A small amount of variation in reading range may occur according to each symbology.
3. All no. of digits are defined using numeric only. With alphanumeric and ASCII characters, no. of digits of a symbology is defined by the specifications and setting on a barcode print application software.
4. All “Recommend no. of digits” and “Maximum no. of digits” are reference only. They may vary according to barcode printing quality, surrounding environment in where scanning barcode takes place, etc.
5. Scanning barcode will take place in the temperature of -20°C, but, the scanning ability may deteriorate.

Basic Condition

Test chart	: a chart produced by Casio (1D, 2D Stacked, 2D Matrix symbologies)
Basic resolution	: 1D; 0.25 mm 2D; 0.5 mm
PCS	: 0.9 or more
Reading range	: 110 mm away from the IT-9000
Pitch angle	: $\alpha = 0$ degree
Skew angle	: $\beta = 10$ degree
Tilt angle	: $\gamma = 0$ degree
Verdict	: Success reading 7 out of 10 required
Surrounding temperature	: 25 °C
Surrounding humidity	: 30 to 50%
Lighting (on the surface of the printed barcode)	: 450 to 550 Lux
Background color of the barcode	: White

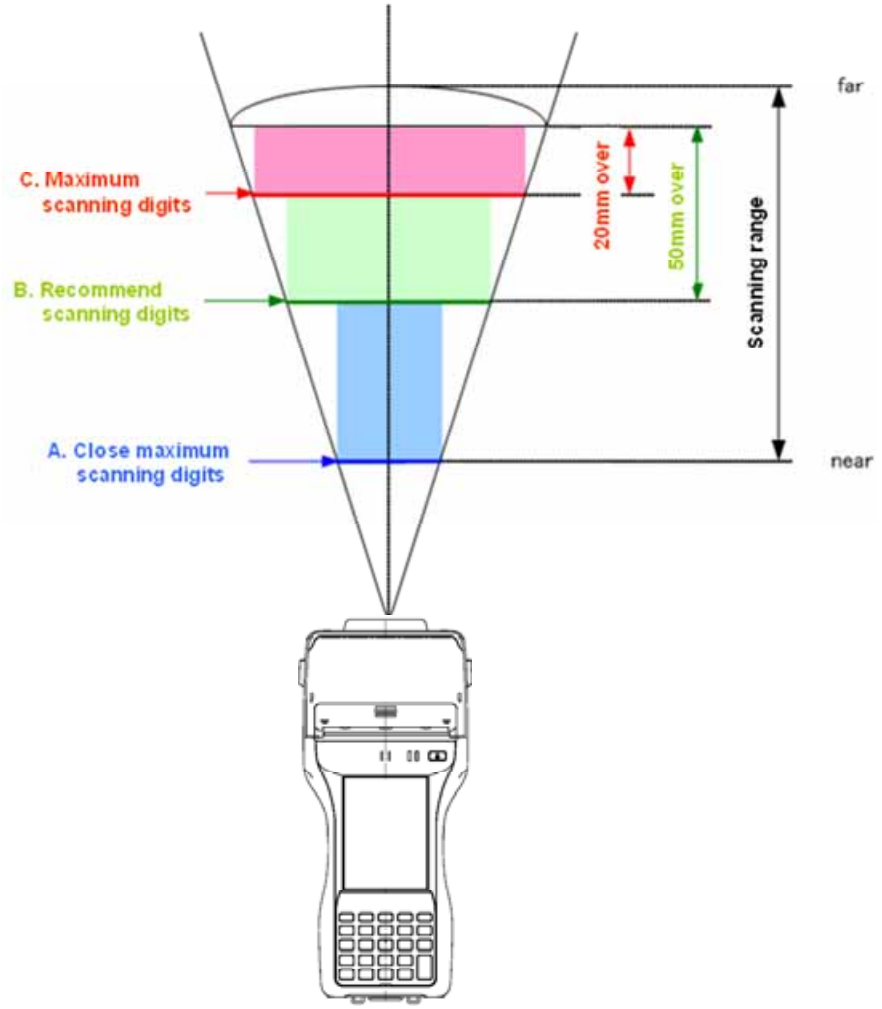


Figure 4.1

Scanning Range with 1D Symbology

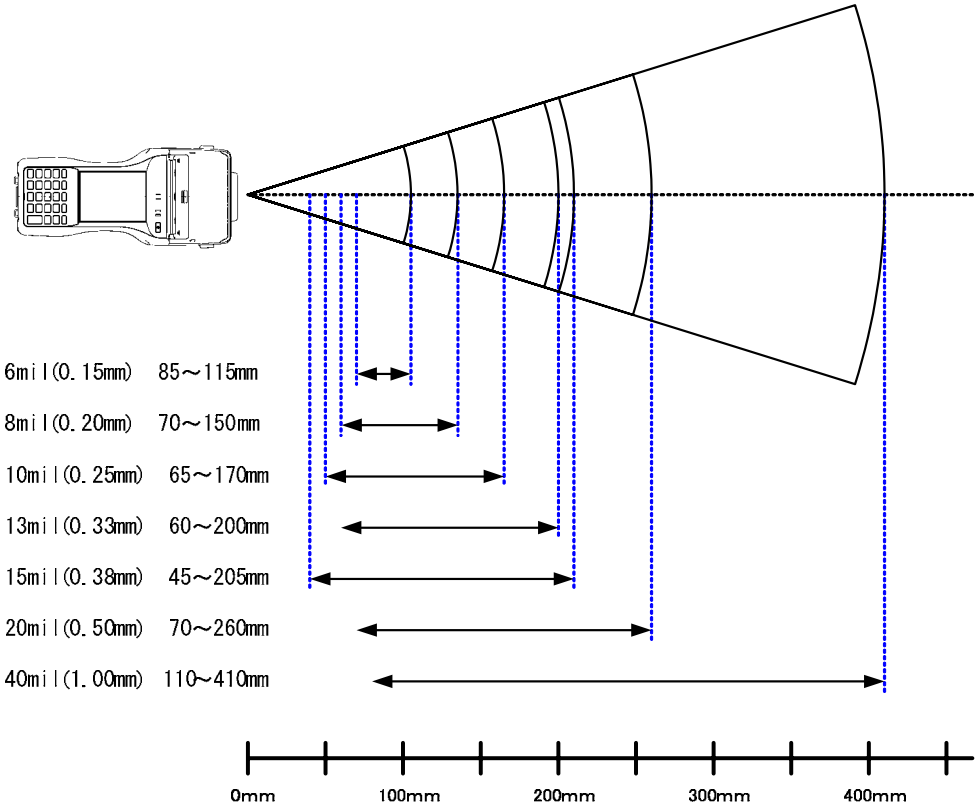


Figure 4.2

Scanning Range with 2D Stacked Symbology

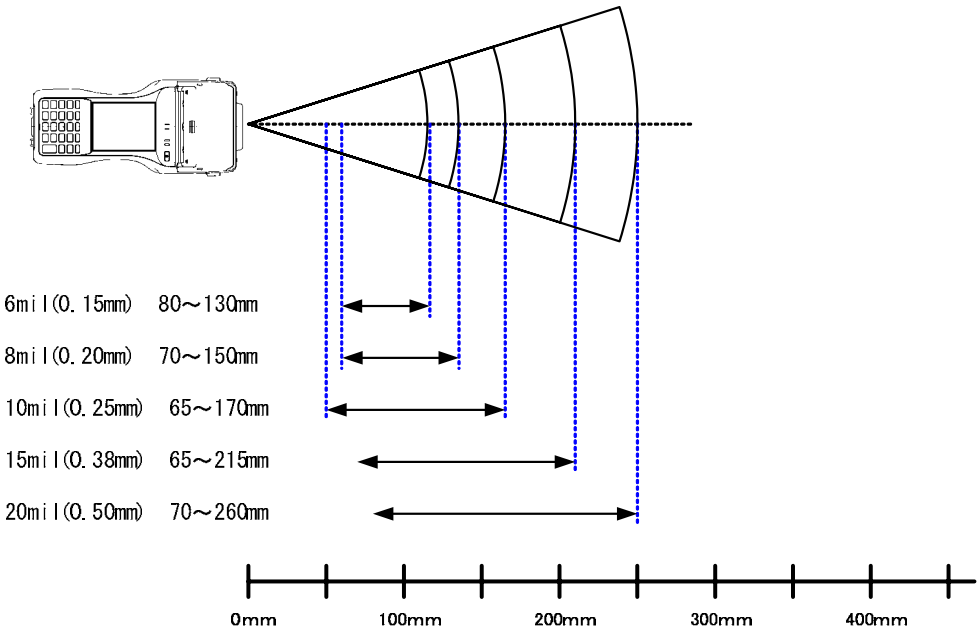


Figure 4.3

Scanning Range with 2D Matrix Symbology

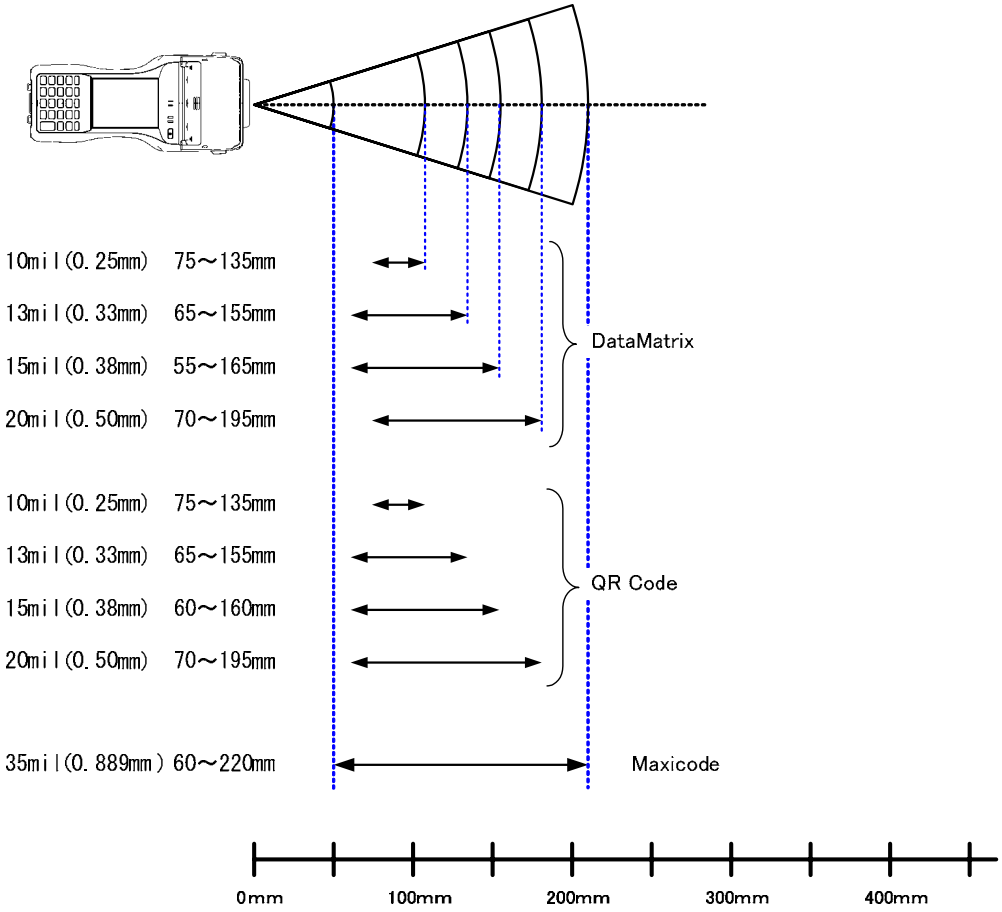


Figure 4.4

Maximum Readable Digits

In this chapter, the definition for maximum no. of readable digits and each maximum no. of digits of the conventional symbologies are explained. See Table 4.42.
All the digits in the table are reference and may vary according to conditions including barcode print quality and surrounding environment.

- Definition

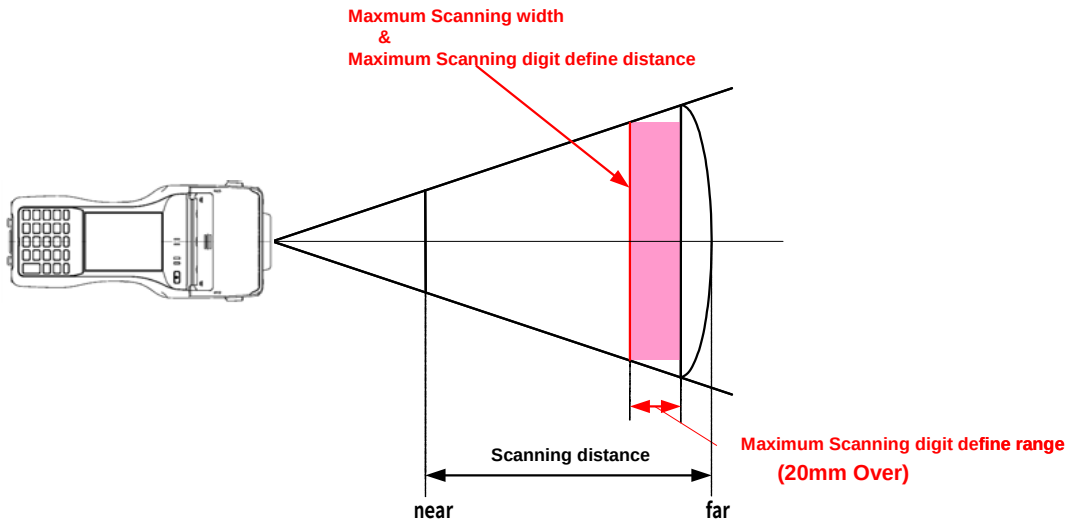


Figure 4.5

Table 4.42 Maximum no. of readable digits for conventional 1D symbologies

Resolution (mm)	Max. scanning range (mm)	Max. scanning digits defined range (mm)	Max. scanning width H direction (mm)	Barcode marginal space (one side) (mm)	Maximum no. of digits					
					Code39 N/W=1/2.5	Code93	Code128 (ASCII)	Code128 (Numeric only)	ITF N/W=1/2.5	NW7 N/W=1/2.5
6mil (0.15)	115	87	65	1.5	26	41	33	67	49	30
8mil (0.20)	150	120	89	2.0	27	42	34	69	51	31
10mil (0.254)	170	139	103	2.5	24	39	31	63	47	28
13mil (0.33)	200	167	123	3.3	22	35	28	57	43	26
15mil (0.38)	205	172	127	3.8	19	30	25	50	38	23
20mil (0.5)	260	224	164	5.1	19	29	24	48	36	22
40mil (1.0)	410	365	267	10.2	14	22	18	37	29	17

Table 4.43 Maximum no. of readable digits for PDF417

Resolution (mm)	Max. scanning range (mm)	Max. scanning digits defined range (mm)	Max. scanning width		Max. size for PDF417		Max. no. of digits (with numeric only)		
			H direction (Horizontal) (mm)	V direction (Vertical) (mm)	Column	Line	ECL4	ECL5	ECL6
6.6mil (0.168)	130	102	75	48	16	58	2616	2522	2336
8mil (0.20)	150	120	89	56	16	58	2616	2522	2336
10mil (0.254)	170	139	103	65	16	58	2616	2522	2336
15mil (0.38)	215	181	134	85	16	58	2616	2522	2336
20mil (0.5)	260	224	164	104	14	64	2522	2429	2242

Notes:

- All the values in the tables are calculated with no. of columns and no. of lines that are optically readable. However, they may vary according to encoding software you use.
- Each number of Column does not include the right and left low indicators. See Figure 4.6.
- Setting on the nos. of Column and Line may differ according to barcode printing application software. Check the sizes of H and V directions for maximum readable width for optimum setting.
- Generally, the no. of digits for alphanumeric characters takes approximately two-third for that of numeric, and for ASCII characters approximately two-fifth.

Example of PDF417 Structure (6 columns x 5 lines)

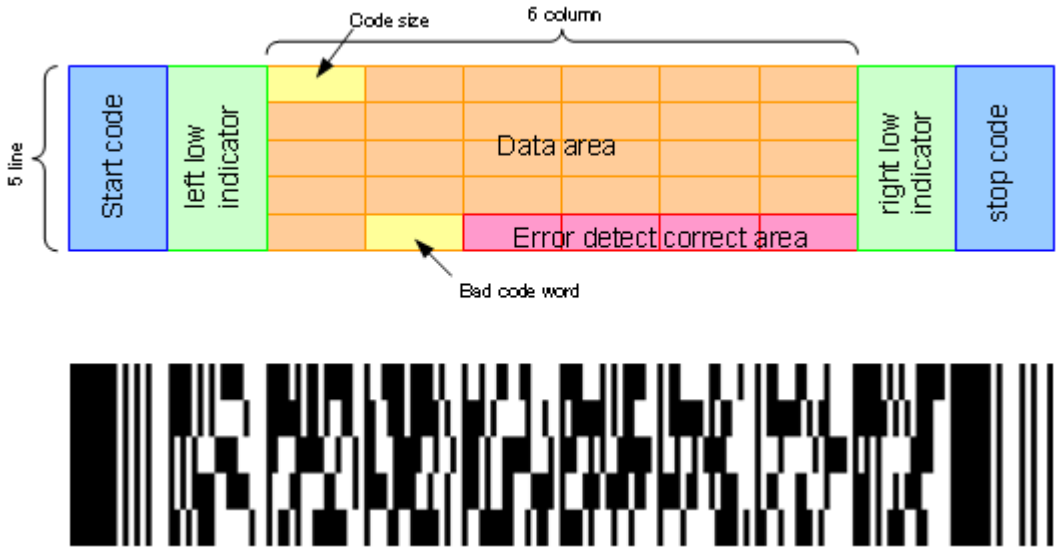


Figure 4.6

Focal Points of Image Capture Area and Laser Aimer Area

On the C-MOS imager, two focal points of the image capture area and laser aimer area are slightly slipped off. This persuades your care specially when you scan a relatively large size of barcode or when you capture image.

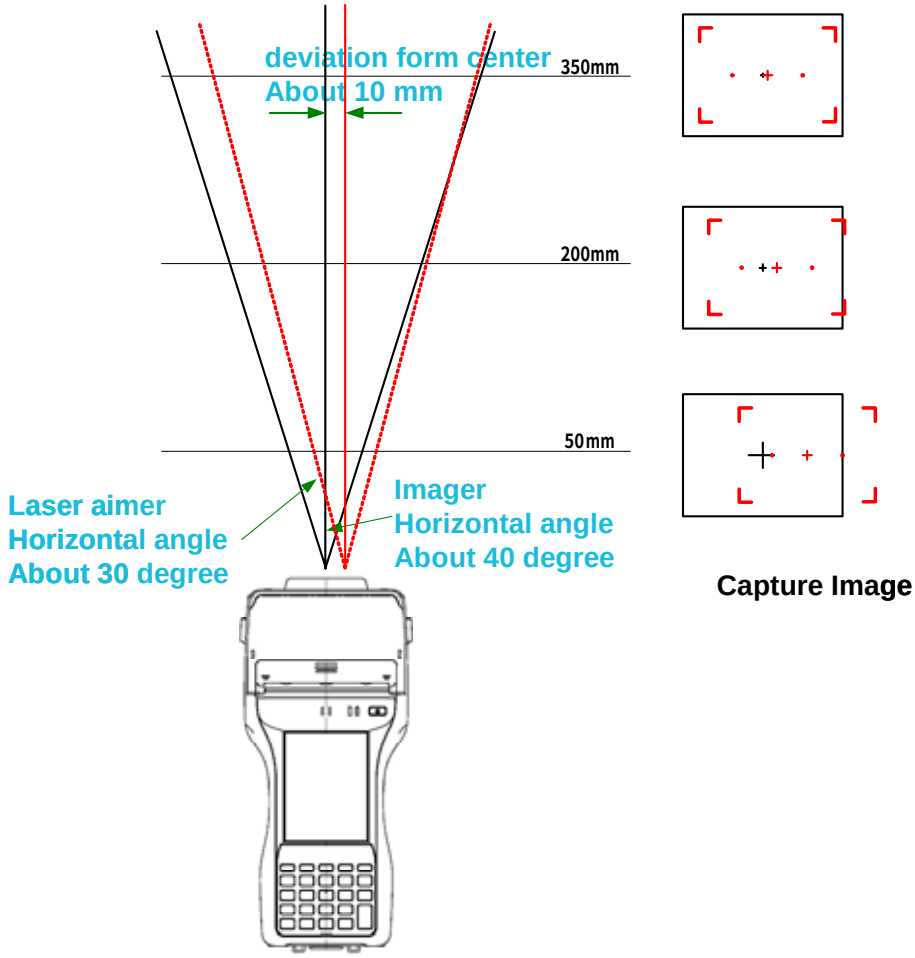


Figure 4.7

The figure shows an image of two focal points for the image capture area and the laser aimer area that slipped off. Also note that the laser aimer itself has an individual characteristic which causes the aimer to appear differently from the view above.

4.6.2 Handling Contactless Smart Card

This chapter explains about card accessing area's name and detail, usage of scanning direction and precautions.

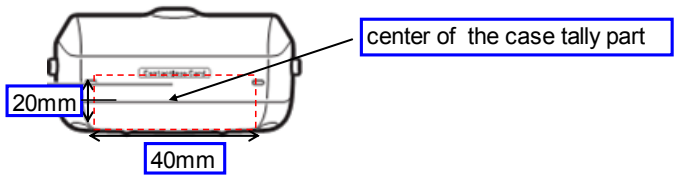
About accessing area's name and detail

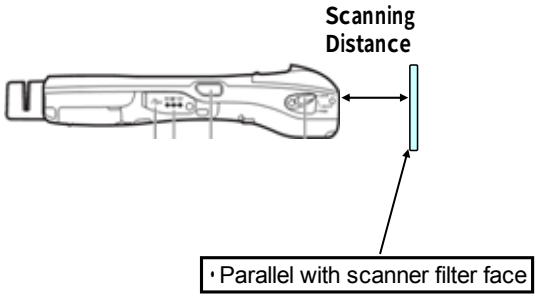
Table 4.44 NFC's Access Block and Areas

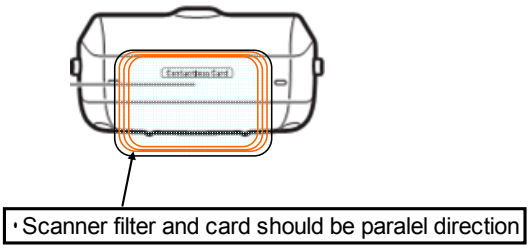
Block/Area	Description	Remarks
ID block	Reads individual ID of contactless smart card.	
Non-security area Private area	Data area which do not require password authentication or communication packet encryption to carry out read or write data.	
Security area Common area	Data area which requires password authentication or communication packet encryption to carry out read or write data.	Configuration of secured system with security module or security server may be required.
Common area	Memory area for public service of specific company (Felica only)	
Private area	Memory area which can be used as free for card publisher(Felica only)	

About scanning range

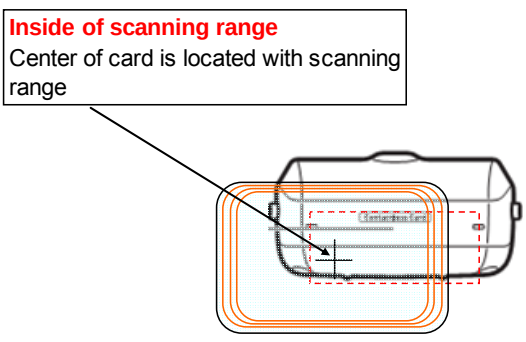
Referrence for Scanning range

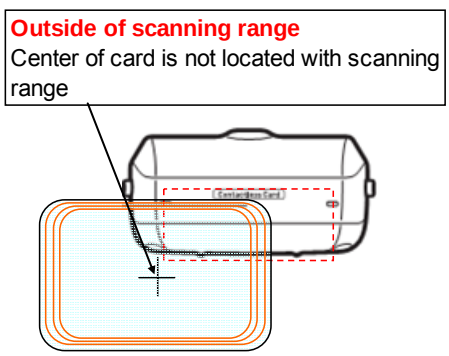






Guide for scanning range



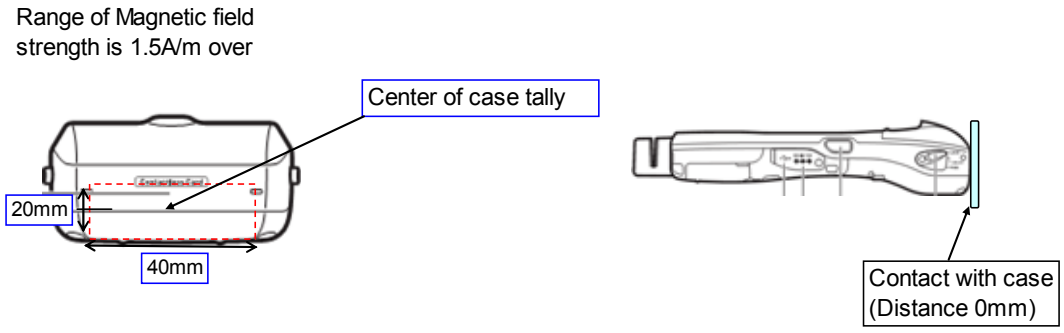


About operating magnetic field

Contactless Smart Card Standard ISO 14443 and Felica, RFID tag Standard ISO 15693 is defined magnetic field strength (radio wave strength) for communicating with card and tag, and this is standard of communication distance with card and tag.
But magnetic field strength described in this section is imaged 85 x 54mm (4 times scroll antenna) card tag, therefore communication distance will be changed by style of tag and number of scroll antenna. (ex. If tag style will be small, antenna sensitivity will be bad, therefore communication distance is not same.)
This description can not be guaranteed all cards and tags communication, therefore please execute enough operation test before installation.

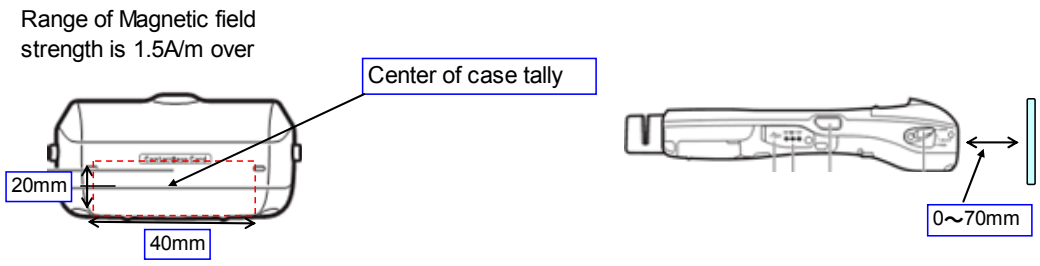
Contactless Smart Card (ISO14443 Type A/B, Felica)
Condition

Minimum operating magnetic filed	1.5A/m over
Direction	Parallel direction with scanner filter
Angle	Parallel with scanner face
Range	Around Scanner filter (32 x 20mm)
Distance	0mm (Contact with case)
Style	ISO7810(JISX6301) standard card's style



RFID tag (ISO15693)
Condition

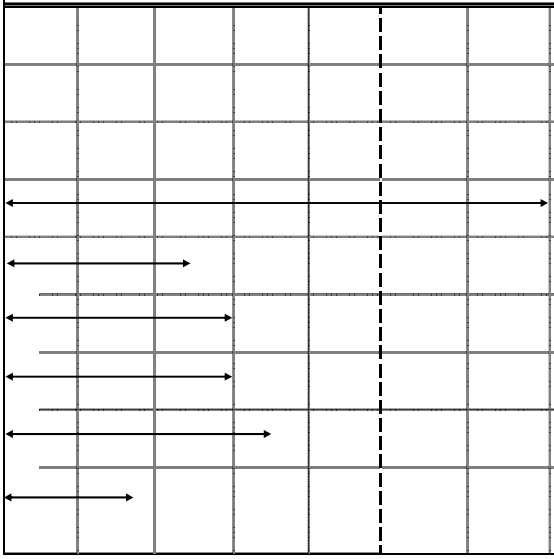
Minimum operating magnetic filed	1.5A/m over
Direction	Parallel direction with scanner filter
Angle	Parallel with scanner face
Range	Around Scanner filter (32 x 20mm)
Distance	0mm (Contact with case) – 50mm
Style	ISO7810(JISX6301) standard card's style



Note:
There is possibility to change scanning range or can not scan by RFID tag/ Contactless Smart Card antenna style or power consumption.
Especially, there is a case which ISO14443 TypeB card such as IC driver license need 1.5A/m over magnetic field strength.
Antenna sensitivity most strength location is center of scanner filter.

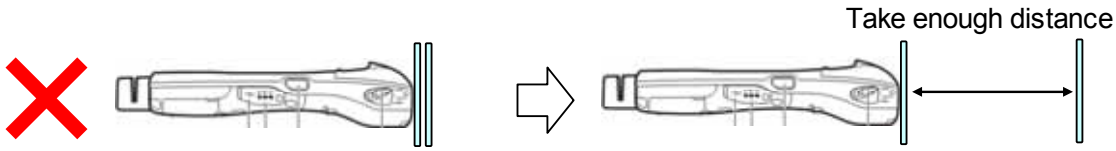
Scanning distance (Reference)

Scanning distance of RDIF tag / Contactless Smart Card will be different with antenna style or number of scroll or IC chip type.
The following reference is information of scanning distance at each style of RFID tag / Contactless Smart Card. This is just reference value, therefore please execute enough operation test before installation.

Scanning Distance (reference) 0mm 50mm		Standard	Style	Remarks
	0mm	ISO14443 Type A	86×54mm Card	
	0mm	ISO14443 Type B	86×54mm Card	
	0mm	Felica	86×54mm Card	
	0～60mm	ISO15693	86×54mm Label type	
	0～20mm	ISO15693	50×18mm Label type	
	0～20mm	ISO15693	18×18mm Label type	
	0～30mm	ISO15693	φ21mm Resin mold,coin type	
	0～30mm	ISO15693	42×20mm Resin mold,coin type	
	0～20mm	ISO15693	58×48mm Metal support,Label type	Case of put on the metal object in direct.

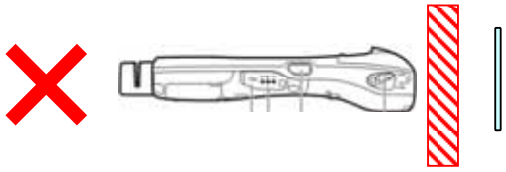
Note of operation

In the following case, there is possibility to can not read and write of RFID tag / Contactless Smart Card.
*Several pieces RFID tag / Contactless Smart Card are piled up.



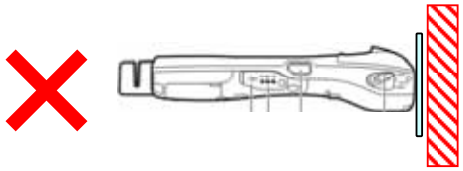
- Do not locate nearby with not scan RFID tag / Contact Smart Card .
- If several cards is located in same pass case inside, you should take out necessary card from pass case.
- Take enough distance between RFID tags / Contactless Smard Cards.

*Exist metal material between antenna and RFID tag / Contact Smart Card



- If you place Contact Smart Card in wallet, you should take out necessary card from wallet.
- If RFID tag is located in metal case, you should take out RFID tag from metal case then execute scan operation.

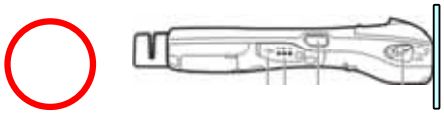
*Put on RFID tag / Contactless Smart Card to metal object.



- Keep about 30mm distance between RFID tag / Contact Smart Card and metal object.
- Use metal support tag.

*Do not locate RFID tag / Contact Smart Card to antenna face as vertical position.

- Closer RFID tag / Contact Smart Card to antenna face as parallel position.



Note of usage

1. If you access to security area of card, there is necessary case which configure secure system by security module or security server.

4.6.3 Roll paper back barcode pre-print making guidelines

TBD